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NORMAL AND ABNORMAL

PSYCHOLOGY

NORMAL AND ABNORMAL

WITH SPECIAL REFERENCE TO THE NEEDS OF MEDICAL STUDENTS AND PRACTITIONERS

BY

JAMES WINFRED BRIDGES, PH.D.

PROFESSOR OF PSYCHOLOGY IN THE FACULTY OF MEDICINE MC GILL UNIVERSITY

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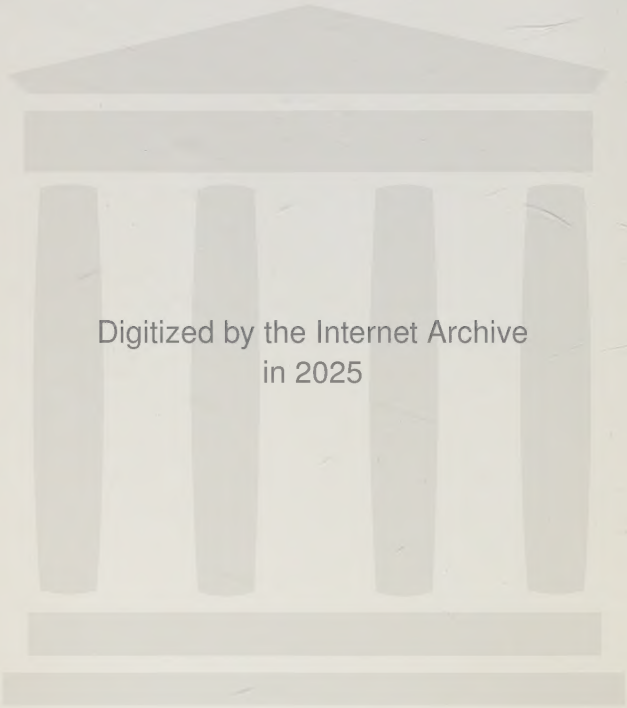
OF MC GILL UNIVERSITY

A PIONEER IN THE PROMOTION OF
PSYCHOLOGY IN MEDICAL EDUCATION



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PREFACE

This book presents the main facts and theories of normal and abnormal psychology and attempts to relate them to the actual and assumed functions of the nervous system. It sets forth at the same time a system of psychology. The standpoint is similar to that defined by Warren in his *Human Psychology*. It is based upon the double-aspect theory of mind-body relation, and thus recognizes both introspective and behavioristic methods. Psychology treats of both consciousness and behavior. The problem of the relationship of these two aspects of experience is squarely faced from the beginning; and it is held that a philosophical foundation is essential for psychology, as indeed it is for all sciences.

The point of view adopted permits of eclecticism in the selection of material and often leads to reconciliation of seemingly divergent views. The text, therefore, includes contributions from the various schools of psychology. It comprises important findings and significant doctrines of structural and functional psychology, of behaviorism and of psychoanalysis.

The book was written with special reference to the needs of medical students and practitioners. Medical colleges at present very generally recognize the importance of psychology in the medical curriculum, but no suitable textbook is yet available for a course for medical students. The writer has attempted to meet the requirements of such a course. He feels that the general stand-

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point of the book as well as the following features will appeal to the medical profession.

First, psychological facts and theories are intimately linked with those of physiology. Thus the student or practitioner will be able to understand psychology more readily through his previous knowledge of neurology, and will get a better appreciation of man as a psychobiological unity. The writer holds that psychology should be a part of the medical curriculum rather than a premedical subject, and that it should follow anatomy and physiology. Nevertheless, sufficient description of the behavior mechanism is included in the book to satisfy the needs of nonmedical readers.

Secondly, abnormal mental processes and behavior are described in connection with the normal, but the book does not presuppose any knowledge of normal psychology. The aspects of psychology of greatest interest to the medical man are thus given due emphasis.

Thirdly, the attempt has been made to define and delimit the field of psychology. The writer feels that psychologists in the past have tended to encroach upon the practical fields of medicine, education, social work, and other professions, instead of merely contributing to the scientific foundations of work in the applied fields. It is shown that psychology has the same value for the medical man as anatomy and physiology have, and that there is no more reason for conflict between psychology and medicine than between physiology and medicine.

Abnormal psychology is without doubt the best approach to the understanding of human nature. Abnormal behavior and mental processes are merely exaggerations or diminutions of normal functions. Normal processes are thus thrown into relief and can be more easily studied.

The study of the abnormal throws light on the normal. For this reason it is anticipated that the book will appeal to others as well as to the medical profession. It is hoped that it will be found interesting and helpful to educationists, lawyers, preachers, social workers, and all educated laymen. The book is primarily an introduction to psychology and may therefore be found useful as a textbook in college courses.

The facts and principles discussed are illustrated wherever possible, but "case studies" are avoided. Full description of cases involves much nonpsychological material and thus belongs to psychiatry, social work, and perhaps sociology. Psychology is an analytic science, and illustrations should therefore be specific instances of the particular fact or problem described. Moreover, it seems desirable that examples and illustrations in a textbook should be used sparingly and with discretion. They probably have more human interest than pedagogical value. Students frequently remember the illustration and forget the principle illustrated.

The reader will find references for further study in the footnotes and in the bibliography at the end of the book. Several volumes of "readings" in different branches of psychology are also available. Robinson and Robinson's *Readings in General Psychology* and Taylor's *Readings in Abnormal Psychology and Mental Hygiene* will be found particularly valuable for collateral reading in conjunction with this text.

The writer wishes to acknowledge his indebtedness to various authors mentioned in the text and to others whose work has become a part of psychological tradition. He also tenders grateful acknowledgment to Dean C. F. Martin of the Faculty of Medicine of McGill University,

and to Dr. C. M. Hincks, medical director of the Canadian National Committee for Mental Hygiene, for their co-operative interest in psychology for medical students. He is particularly indebted to his wife, K. M. Banham Bridges, who read the manuscript chapter by chapter as it was written and offered many valuable criticisms and suggestions. Thanks are also due to his secretary, Miss V. L. Davidson, for her painstaking and untiring work in the arduous task of preparing the manuscript; and to the authors and publishers who have permitted the use of illustrations from their works.

J. W. B.

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PSYCHOLOGY
NORMAL AND ABNORMAL

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CHAPTER I

WHAT PSYCHOLOGY IS

The first question that will probably occur to most readers is, "What *is* psychology?" An intelligible answer to this question is not possible prior to a knowledge of some of the facts and principles that constitute the science. But it is possible at the beginning to give a rough provisional definition of the subject and to indicate its general nature, scope, and relationships. The point of view regarding psychology presented in this book will be better understood and more fully appreciated after a brief consideration of some of its historical antecedents. Five definitions of psychology are therefore given, each definition representing a stage in the evolution of the science.

Science of the soul.—In ancient and medieval times psychology was defined as the science of the soul, and the word "psychology" is derived from two Greek words meaning "discourse" or "thought" about the "soul." The medieval philosophers regarded the soul as an immaterial substance or entity that was separate from the body and could exist independently of it. The soul was not an object of immediate awareness by an individual, but was rather the unknown principle that gave mental life its unity and coherence. The soul is thus a theological or metaphysical

concept, and as such cannot be an object of scientific inquiry. Moreover, as William James pointed out, it is not necessary to postulate a soul in order to describe and explain human consciousness and behavior. In other words, it is possible to have a "psychology without a soul." [1] This, however, is not equivalent to denying the existence of a soul. It merely means that the soul is outside the pale of psychology as a natural science.

Science of the mind.—Psychology was next defined as the science of mind, and it is still frequently defined in this way at the present time. The meaning of the term "mind" has, however, in the meantime been very materially altered. Mind was at first thought of as something quite analogous to the soul, and the change was chiefly a change in the term used. Mind at this stage was also regarded as a relatively independent and separate thing, and was supposed to be made up of more or less unrelated faculties or powers such as the faculty of attention, memory, will, and so forth. Mind was likewise regarded as comparatively unknown by the individual, though through its faculties it manifested itself in experience.

There are two main objections to this point of view about mind as the subject matter of psychology. In the first place, it is generally recognized to-day that mind does not consist of faculties. The so-called faculty psychology is now interesting only as a matter of history. It has been found, for example, that memory cannot be regarded as a single power of the mind. It can be analyzed into much finer units such as memory for numbers, memory for names, memory for places, and the like. It is thus more nearly correct to speak of "memories" in the plural than

[1] William James, *Principles of Psychology* (Holt, 1890), Vol. I, pp. 1-10.

of "memory" in the singular. The same is true with regard to attention and the other reputed faculties. Secondly, in so far as the mind was regarded as outside of experience, it was like the older concept of the soul, not a possible subject for empirical science which must begin with experience.

Science of consciousness.—About the middle of the nineteenth century, psychology came to be regarded as the science of consciousness. Consciousness as distinguished from soul or mind is equivalent to immediate experience. It includes such experienced processes or facts as perception, imagination, ideation, feeling, emotion, and impulse. At this stage of its development psychology became a truly empirical and inductive science as distinguished from the older rational or deductive psychology. In other words, psychology now became a study of facts, but facts of a special kind, namely, facts of consciousness.

Facts of consciousness may be distinguished from facts of the physical sciences by their more immediate and subjective nature. For example, light for the physicist is vibration or emanation which is an inferred or indirect experience, while for the student of consciousness light is the immediate experience of brightness or darkness, or blue, or yellow, or red, or what not. Similarly, sound as a physical phenomenon is vibration, while as a conscious fact it is noise or tone, consonance or dissonance. So, also, emotion may be regarded as an objective physiological phenomenon. It is from this point of view response of the autonomic apparatus, the smooth muscles and glands. As a fact of immediate experience it is, however, a peculiar stirred-up state of consciousness describable as irritation, anger, fear, love, or jealousy.

Psychology considered as the science of consciousness

treats of these immediate experiences. Its aim is to describe and if possible explain them. The term "mind" is frequently used at the present day to mean just the sum-total of such experiences. It is thus practically equivalent to the term "consciousness," and from this point of view psychology is often called "the science of mind." There are still many psychologists who regard psychology as the science of consciousness. They are sometimes spoken of as "introspectionists" because their method of study is introspection, that is, subjective or self observation. There are, moreover, different schools of introspectionists. The most important of these are the functionalists and the structuralists.

The chief task of *structural psychology* is the analysis of consciousness into its various parts and elements. It is concerned with the structure of the cross section of consciousness at any given moment. This is analyzed into its parts which are called "mental states." For example, a cross section of one's consciousness at any time during a lecture may consist of such mental states as perceptions of words and their meanings, visual perceptions, memory ideas aroused by association with the words heard, ideas anticipating the end of the lecture, feelings of interest or ennui, and so forth. These states may also be further analyzed into more or less hypothetical elements, such as sensations and simple feelings. Structuralism is thus a static point of view. This type of analysis has nevertheless contributed much to the science of psychology, particularly to the psychology of sensation and perception. A recent type of psychology, known as the "Gestalt" or configuration psychology, may be regarded as a modification of the older structural psychology. It is, however, more synthetic and describes conscious totalities or con-

figurations instead of attempting to reduce them to their actual or hypothetical elements.

Functional psychology is more concerned with the sequence of mental events than with their analysis. It treats of mental processes rather than of mental states, and with the "stream of consciousness" rather than with its cross section. Functional psychology is thus a dynamic psychology and, as such, has contributed much to our understanding of human nature, especially on the subjects of association, instinct, feeling, emotion, and the motivation of behavior. The functional psychologists have usually concerned themselves with behavior as well as consciousness, but as a rule they have not developed a satisfactory hypothesis as to the relationship between these two kinds of facts. They often assume or imply the theory of interactionism which, as will be pointed out in a succeeding chapter, is not a satisfactory view on the mind-body problem.

Science of behavior.—This is a very recent definition of psychology although it has its historical antecedents. The advocates of this view believe that psychology should dispense with consciousness altogether and should devote itself to the study of behavior alone. They assert that it is impossible to have an exact science of consciousness for various reasons but chiefly because consciousness is subjective and known only to the individual himself. No one can study another's consciousness directly; he can only infer consciousness in other persons and speculate about it. It is, however, possible, at least in principle, to have an exact science of behavior, because behavior can be observed in many individuals and under many conditions, and can be explained by referring to antecedent physical conditions of the same sort as are described by

other sciences, such as physiology, neurology, chemistry, and physics. The behaviorists, therefore, concern themselves with the origin and development of behavior, its analysis and explanation. They also have contributed a great deal to the understanding of human nature, especially on the subjects of reflex and instinctive behavior, conditioned behavior, and the acquisition of habits of various kinds.

Science of both consciousness and behavior.—The point of view that will be taken in this book is that psychology is the science of both consciousness and behavior. It deals with two orders of facts, namely, facts of consciousness observed introspectively, and facts of behavior observed objectively. Perhaps the best systematic exposition of this point of view is to be found in Warren's *Human Psychology*. Warren first defines psychology as "the science which deals with the mutual interrelation between an organism and its environment." [2] He then points out that the environment affects the organism resulting in consciousness, while the organism responds to the environment resulting in behavior.

In this interrelation the nervous system, particularly the cerebrum, occupies an important and unique position; for neural activity is the immediate antecedent of behavior and is at the same time experienced by the subject as consciousness. In fact, consciousness and neural activity are related as two aspects of the same thing. It is, therefore, possible to study neural activity objectively through behavior, or subjectively by means of introspection. This double aspect theory of mind-body relationship will be further discussed in Chapter III; but it

[2] H. C. Warren, *Human Psychology* (Houghton Mifflin, 1919), p. 13.

should be noted here that the results of both introspectionists and behaviorists may be incorporated into a system of psychology developed from this point of view.

Methods in the study of psychology.—In so far as psychology is the study of behavior, the methods adopted will be similar to those used in the physical sciences, especially in physiology. But in so far as it is the study of consciousness, the methods employed will necessarily be somewhat different. The observation of facts of behavior is frequently referred to as inspection or *objective observation,* while the observation of the facts of consciousness is called *introspection,* or subjective observation. In either case, the observation may be under controlled conditions, or merely casual as in ordinary life.

Observation under controlled conditions is known as *experiment.* Psychology adopted an experimental method as long ago as the middle of the last century. The first laboratory of psychology was founded by Wundt at Leipzig in 1870 for the study of conscious states by means of introspection under controlled conditions. Behaviorists also make wide use of the experimental method in their objective studies of behavior. From the point of view here adopted, psychology includes the study of both consciousness and behavior, and consequently both introspection and objective observation are equally important methods of ascertaining the facts.

The *comparative method* may also be used in the study of psychology just as it is used in anatomy and physiology. Human behavior may be compared with the behavior of animals at different stages in the phylogenetic scale. Adult behavior may be compared with the behavior of children at different levels of their development. The behavior of mentally diseased persons may be compared

with the behavior of mentally healthy people; and abnormal behavior or mental functions may be compared with normal psychological processes. The comparative method has thus a wide range of application and is a particularly fruitful approach to the study of psychology. It is specially emphasized throughout this book which treats of abnormal as well as normal psychology.

Relation of psychology to other mental sciences.— It is important that the medical student or practitioner should distinguish between psychology, abnormal psychology, psychiatry, and mental hygiene. *Abnormal psychology* is that branch of the subject which treats of deviations from the normal in consciousness and in behavior. This statement requires considerable elaboration which will be undertaken in the following chapter. It is important to note, however, that both normal and abnormal psychology are primarily pure sciences analogous to physiology and that they, like the latter, are, or should be, basic sciences in medical education.

Psychiatry, on the other hand, is a medical specialty, somewhat analogous to other medical specialties, like dermatology and ophthalmology. It is thus an applied science or an art, whose final object is the diagnosis and treatment of mental patients. It is broader than psychology. It includes the physical as well as the mental symptomatology of mental defects and diseases, their etiology, their pathological anatomy, and any other scientific knowledge that can be applied to their diagnosis and therapy. It also includes the highly important subject of the institutional care of mental patients.

Mental hygiene is a recent development in the field of preventive medicine. It is primarily a movement whose object is the promotion and preservation of mental health.

It is thus a part of the public health movement. Its chief task is the education of the public in those scientific principles and practices which have a bearing upon mental health. But mental hygiene is also the art of handling and correcting various minor problems and maladjustments, which interfere with happiness and well-being, and which may lead to more serious forms of mental disorder. Its object is not only to prevent mental disease and defect, but also to promote the development of the best possible type of personality. It therefore seeks to encourage scientific investigation into all the factors, hereditary as well as environmental, that cause not only mental disease, mental defect, and delinquency, but also unhappiness, inefficiency, and other undesirable conditions.

Relation of psychology to the biological sciences. —Psychology may be regarded as one of the biological sciences, since it deals with certain aspects or manifestations of life. It is thus coördinate with anatomy and physiology. In the study of behavior, psychology somewhat overlaps the field of physiology, just as physiology overlaps the field of biochemistry. But while physiology is primarily concerned with the functions of organs, behavior psychology deals more especially with the functions of the total organism, that is to say, with the responses of the total organism to environmental situations. Psychology as a study of behavior is, in principle at least, as exact a science as physiology. On the other hand, psychology as the science of consciousness is from its very nature more speculative and inexact, because, as previously stated, each individual can observe only his own consciousness. This part of psychology cannot, however, be dispensed with, because consciousness is an im-

portant aspect of personality and a fact which, as such, challenges investigation.

Relation of psychology to the normative sciences.—Psychology is a positive, as distinguished from a normative science. In other words, it deals with the facts of consciousness and of behavior as they are, and does not set up standards of thinking or of conduct. The normative sciences are logic, ethics, and æsthetics. Logic tells us how we ought to think and reason if we wish to arrive at true conclusions. Psychology describes the way we actually do think in everyday life. Ethics tells us how we ought to behave if we wish to be good citizens. Psychology studies actual behavior, whether good or bad. Similarly, æsthetics sets up standards of what we ought to appreciate in music, art, or literature. Psychology studies what we actually do appreciate, whether beautiful or ugly. In other words, psychology like other positive sciences, deals with what is, and not with what ought to be; and a psychologist must learn to study the facts of human nature without assigning to them values of any sort.

It is particularly important that the student should not confuse the analysis of mental processes and behavior with their ethical evaluation. Many people have a preconceived notion that the analysis of a phenomenon must necessarily degrade it. For instance, they believe that a reformer is to be deprecated because his behavior can be reduced by analysis to the expression of certain instinctive drives. It is obvious that the human body is none the less wonderful because it may be analyzed into chemical elements purchasable at a drug store for 97 cents. So, also, altruism and love are not less socially or morally desirable because they are based upon certain

fundamental and instinctive motives. The student of psychology must therefore distinguish between scientific analysis and ethical evaluation, and in particular must try to emancipate himself from the prejudice that analysis degrades the thing analyzed.

Relation of psychology to the pseudo-sciences.—Psychology must be distinguished from *psychical research*. The latter concerns itself chiefly with such problems as telepathy and spirit communications. Telepathy or the transference of thought from one mind to another independently of the ordinary sensory channels has never been proved, notwithstanding the frequency of belief in such a phenomenon. The numerous experiments that have been performed on this subject in laboratories under controlled conditions have consistently resulted in negative conclusions. Students of psychical research are inclined to assume the possibility of telepathy in an uncritical way, and their assumptions pertaining to spirit communications are even more unjustified and quite without the pale of science. The mysterious and occult phenomena with which psychical research deals may be accounted for without the necessity of assuming supernatural agencies. This will be more evident after a study of normal and abnormal psychology.

Psychology must also be distinguished from *phrenology*, palmistry, and other forms of character analysis based on physical traits. Phrenology attempts to determine traits of intellect, character, and temperament by studying the size and shape of the head, and the so-called "bumps." It is based on two assumptions that have been proved false, namely, the faculty theory of the mind, and the theory of the exact cerebral localization of mental functions. Attempts have been made to correlate

traits of personality with other physical traits, such as physiognomical features, shape of the hand, color of hair and eyes, and so forth. Many of these systems of character analysis are on the market, but none of the correlations claimed by their authors has yet been proved by scientific methods. These systems are therefore also at present outside the pale of scientific psychology, although the problem of the correlation of mental and physical traits is a real one which requires investigation.

The scope of psychology.—An idea of the scope of psychology may be obtained from a brief statement of some of the different branches of the subject. General psychology is the psychology of the normal adult human being. Genetic psychology is the study of the development of consciousness and behavior in the individual, or their evolution throughout the whole phylogenetic scale. The former may be called ontogenetic, and the latter phylogenetic psychology. These branches are commonly referred to as child psychology and animal psychology. They are both comparative in their method in as much as different stages of development are compared with each other. Abnormal psychology, the study of marked deviations from the norm or median, has already been mentioned. Individual psychology treats of the differences among individuals, but differences which are not sufficiently marked to be regarded as abnormal. Racial psychology is the study of the differences among the major branches of the human family called races. It may also treat of the differences among different stocks of the same race, such as the Nordic and Alpine stocks of the white race. Social psychology is a study of the responses of the individual to his social environment, that is, to other persons, groups, and institutions.

The above branches of psychology are all primarily pure or theoretical psychology. But psychology has also been applied in many fields of human activity, particularly in education, law, industry, and medicine. These branches of applied psychology are considered in Chapter XXIX. This book is concerned mainly with the problems of normal and abnormal psychology, but there is also occasional reference to certain aspects of genetic, social, and applied psychology.

CHAPTER II

THE MEANING OF ABNORMAL

The term "abnormal" has a wide popular usage but there is no general consensus of opinion as to its exact meaning. It is sometimes used as equivalent to pathological or morbid, and it is usually identified with the undesirable. The term obviously means deviation from the norm or normal, but the difficulty in definition arises in connection with the meaning of normality. In order to get a clearer idea of the meaning of the abnormal it will therefore be necessary to discuss the meaning of the normal.

Two views of normality.—The various views regarding normality may be classified under two main headings, namely, normative conceptions and statistical conceptions. According to the *normative* view the normal is regarded as the ideal function or the best possible adaptation. This is a view frequently held by physicians, but it is not an accurate or workable view for it contains a subjective factor, namely, opinions or ideals which differ from person to person. Thus it would be impossible to give a definition of "best possible adaptation" that would be generally accepted.

According to the *statistical* view the normal is merely the central tendency of a group or what is usually called the average. This is an objective and quantitative conception. From this point of view the normal can be definitely determined in the case of all measurable traits or

functions, and in the case of nonmeasurable traits it can be determined in principle if not in fact. The statistical view is therefore the one most commonly adopted for scientific purposes. It is consequently extremely important to get a clear idea of the meaning and the implications of this view. It will assist towards a better understanding of this quantitative conception of normality and abnormality to consider at first a few of the simpler statistical concepts.

A few statistical concepts.—If the amount of a mental or physical trait has been measured in a large number of cases, it is usually inconvenient to report in detail all the individual measurements. A rough picture of the group may be obtained by finding a measure of its *central tendency* and its variability. There are three different measures of central tendency, namely, the mean, the mode, and the median. The *mean* (arithmetic mean or average) is obtained by dividing the sum of the values or scores by the number of the individual observations or cases. This is probably the best known measure of central tendency. The *mode* is the value of the measurement or score which occurs most frequently. It is the "fashion in cases," since more cases are found with this score than any other. The *median* is the middlemost measurement. It is the point on the scale on each side of which half the number of measures fall. In the accompanying example (Table I), the scores represent memory for digits, that is, the number of digits that can be repeated after they are heard once. In this example all the scores are presented, since there are only thirteen cases. The example is given merely to illustrate simple statistical procedures. It will be noted that the sum of the scores is 106, and the mean or average is therefore

8.15, the mode or most frequently occurring score is 7, and the median or middlemost score is 8.

The measurement of central tendency that will be used in any particular case will depend upon the purposes of the statistician. The mode is probably the least satisfactory measurement but it may be used on occasion, when it is desired to ascertain the fashion in cases. The mean represents the "center of gravity" of the scores, for the sum-total of all the scores on either side of it is the same. It is a satisfactory measure of central tendency for ordinary purposes. It is a measurement, however, that is considerably influenced by the extreme cases. Any very high or very low scores will have a marked effect on the mean, especially if there is only a small number of cases. The median is not thus affected by the extreme cases; and it is therefore useful where it is desired to avoid such an effect. The median is also simple to calculate, especially where the cases are already arranged in order of merit.

The median is sometimes referred to as the fifty percentile rank. A *percentile rank* is a rank or grade of a case or score which exceeds or equals any given percentage of the cases or scores. For example, the fifty percentile rank exceeds 49 per cent, equals the fiftieth per cent and is exceeded by 50 per cent of the cases or scores. Similarly, the thirty-sixth percentile rank exceeds 35 per cent, equals the thirty-sixth per cent, and is exceeded by 64 per cent of the cases. A similar statement may be made regarding any other of the one hundred possible percentile ranks. Some percentile ranks other than the median are also given special names. The twenty-fifth percentile rank is called the lower quartile, and the seventy-fifth percentile rank is called the upper quartile. The tenth

TABLE I

ILLUSTRATING SIMPLE STATISTICAL PROCEDURES

Score = memory for digits.
d = deviation from median.
d^2 = square of deviation.
$m.v.$ = mean variation.
σ = standard deviation.
σ^2 = square of standard deviation

Score	d	d^2
11	3	9
11	3	9
10	2	4
10	2	4
9	1	1
9	1	1
8	0	0
7	−1	1
7	−1	1
7	−1	1
6	−2	4
6	−2	4
5	−3	9
13)106	13)22	13)48
Mean = 8.15	$m.v.$ = 1.69	σ^2 = 3.69
Median = 8		σ = 1.92
Mode = 7		

percentile rank and percentile ranks that are multiples of ten are called deciles. These are referred to as the first, second, third, and so on up to the tenth decile. The percentile rank is an exceedingly convenient and accurate rating or measurement of the amount of any mental or physical trait possessed by an individual, for it assigns him to a definite place with reference to the other members of the group measured.

The measures of central tendency tell us nothing about the individual differences among the cases measured. In the "memory for digits" test, the central tendency might be 8, regardless of whether the scores range from 7 to 9,

or from 5 to 11 as in the example. In other words, the scores might vary within wide limits and still give the same central tendency. It is necessary, therefore, to have some measurement of the spread, range, or *variability* of the scores, as well as their central tendency. For this purpose there are a number of different measures, the most important of which are the range, the semi-interquartile range, the mean variation, and the standard deviation.

The *range* is simply the difference between the lowest and the highest scores. In our example the range is 11 to 5, or six digits. This measure of variability is commended by its simplicity, but it is clear that it would be too much affected by one or more extreme scores at either end of the scale. The interquartile range is a measure of variability which to some extent overcomes this disadvantage. The interquartile range is the range between the upper and lower quartiles, that is, between the seventy-fifth and the twenty-fifth percentile ranks. In the example the upper quartile is 10, and the lower quartile 6.25, or roughly 6. The interquartile range is thus 4, and the semi-interquartile range is one-half this amount, that is, 2. The *semi-interquartile range* is a measure of variability which when added to and subtracted from the central tendency gives two scores that include roughly 50 per cent of the cases. In a normal distribution they include exactly 50 per cent of the cases and the semi-interquartile range is then identical with the so-called probable error.

The *mean variation* is the arithmetic mean of the deviations of the individual measurements from their central tendency regardless of algebraic sign. Either the mean or the median may be used as the measure of central tendency in calculating the mean variation. The mean is

probably most frequently used, but in our example the median is selected for this purpose in order to avoid the use of fractions. In the second column of Table I the deviations (d) of each score from the central tendency (8) are given. The sum of these deviations regardless of algebraic sign is 22, which, divided by 13, the number of cases, gives the mean variation (*m.v.*) 1.69. Theoretically the mean variation also, when added to and subtracted from the central tendency, gives a range of score which includes 50 per cent of the cases. The mean variation is a frequently used and fairly accurate measure of variability.

In finding the *standard deviation* the first step is the same as in calculating the mean variation. The deviations of the individual measurements from the central tendency are obtained. These are given in column d in Table I. These deviations are then squared as in column d^2. The sum of these squares is then obtained. In the example this sum is 48. Next, the sum of the squares is divided by the number of cases; and finally, the square root of the result is derived. This gives us the standard deviation, which in the example is 1.92. The standard deviation is thus the square root of the arithmetic mean of the squares of the deviations from the central tendency of the scores. It is usually referred to by the Greek letter sigma (σ), and the formula for deriving it may be expressed as follows:

$$\sigma = \sqrt{\frac{\Sigma d^2}{N}}$$

In this formula $\Sigma\ d^2$ means sum of the deviations squared, and N means the number of cases. The standard deviation is a measurement of variability which includes within

its range on both sides of the central tendency approximately 67 per cent of the cases. It is therefore always larger than the mean variation or the semi-interquartile range. It is especially recommended for exact statistical work, as it bears a definite relationship to the normal curve which is described below.

The distribution of traits.—The frequency of different amounts of the same trait among the population at large may be ascertained by measuring the trait in question in a sufficiently large random sample of the population. The number or percentage of individuals possessing each amount of the trait is thus obtained. This is called a *frequency distribution*. Such a frequency distribution may be plotted graphically as in Figure 1. This figure shows the frequency distribution of stature for 8,585 adult males born in the British Isles. In such a graphic representation of a frequency distribution the different amounts of the trait are represented on the horizontal base line or abscissa, while the number or percentage of persons possessing any given amount of the trait is indicated on the vertical line or ordinate. It will be observed that in the case of height in the illustration the range is roughly from 57 to 78 inches, while the highest point of the curve is between 67 and 68 inches. The highest part of the curve represents the central tendency of the group, while the spread of the curve represents its variability.

There are other significant peculiarities of this *distribution curve*. First, there is only one central tendency, mode or type, and the majority of the variations cluster closely about this center or type. This kind of curve is called a unimodal as distinguished from a bimodal or multimodal curve. Secondly, the variations are continu-

ous, that is to say, there are no unfilled gaps in the curve, but the greater the variation the fewer the number of persons possessing that amount of the trait. Thirdly, the curve is very nearly symmetrical, that is, the variations above and below the central tendency are similar in their amount, and there are about equal numbers of

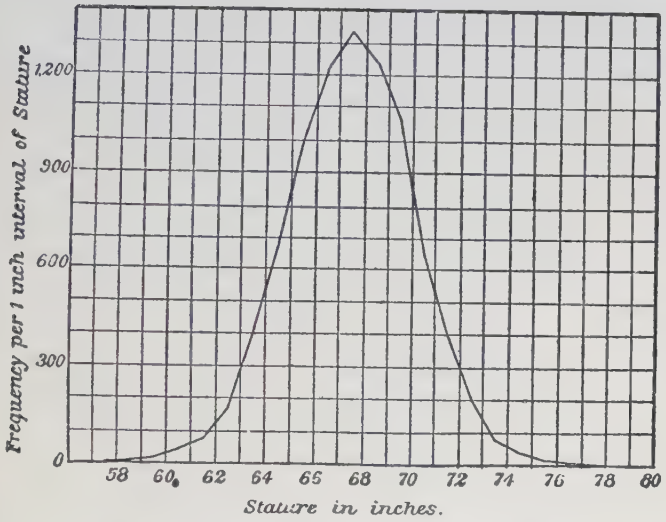

FIG. 1. FREQUENCY DISTRIBUTION OF STATURE FOR 8,585 ADULT MALES BORN IN BRITISH ISLES
(From Yule, *An Introduction to the Theory of Statistics,* Lippincott, 1916.)

individuals showing them. Distribution curves similar to this one are obtained whenever any mental or physical trait is measured and the results plotted in this way.

The distribution curves plotted from actual measurements tend to approximate in form the normal or probability curve which has well-known mathematical properties. The *normal curve* is a symmetrical bell-shaped curve such as the curves shown in Figure 2. It may, of course,

vary in height and in spread so long as it maintains its essential shape and symmetry. The normal curve is sometimes called the binomial curve because the values of the ordinates follow the coefficients of the binomial expansion, $(x + y)^m$. It may also be called the curve of chance because it represents the results theoretically obtained by throwing coins and recording the number of heads, or by throwing dice and recording the number of points. In the normal curve all the measures of central

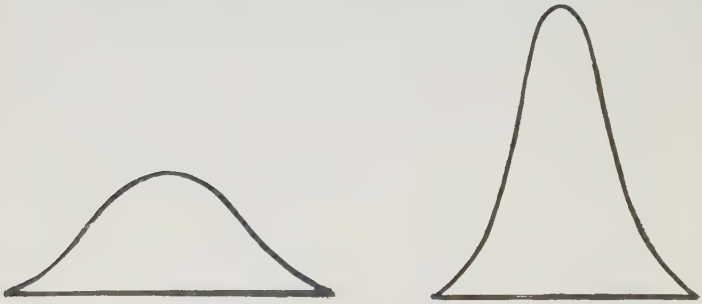

FIG. 2. TYPICAL CURVES OF NORMAL DISTRIBUTION, DIFFERING IN HEIGHT AND SPREAD

tendency, the mode, the mean, and the median, coincide; and the standard deviation is the distance from the central tendency to the point on the curve where it changes from a convex to a concave line. Therefore, if the central tendency and the standard deviation are known, a normal curve may be plotted.

The curves of distribution derived from the actual measurement of physical or mental traits are never exactly normal curves, but they tend to approximate the normal curve more or less closely, depending upon the number and selection of the cases measured. The greater the number and the more random the sample of cases, the closer will be the approximation. The curves actually ob-

tained by such measurements are frequently irregular or *skewed* to the right or left, as in Figure 3. In such curves the measures of central tendency do not coincide but fall at separate points on the scale, as in the illustration.

The curve of distribution has been illustrated by the measurement of height. In other instances where physical traits have been measured in large numbers of cases, similar curves have been obtained. This has been done, for example, in the case of weight, cephalic index, and other

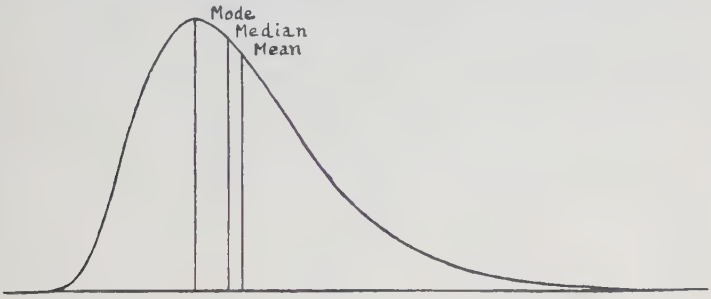

FIG. 3. SKEWED CURVE SHOWING MODE, MEDIAN, AND MEAN

anthropometric measurements. Similar results have also been obtained where functional and dynamic traits have been measured, such as strength of grip and vital capacity. It seems probable likewise that if more purely physiological functions such as rate of pulse, blood pressure, or temperature, were measured in a sufficiently large random sample of individuals of the same age and sex, similar results would be obtained. For example, if the blood pressure of several thousand males of forty years of age were determined, it would be found that a very large proportion of the cases would group themselves about a central tendency, with fewer and fewer

cases, the greater the deviation from that central tendency. That is to say, there is probably a marked variation in blood pressure among nonpathological cases; and the same would probably be true of temperature, although

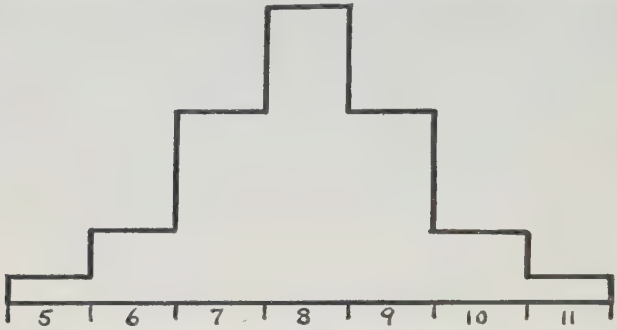

FIG. 4. DISTRIBUTION OF "MEMORY FOR DIGITS" OF 123 WOMEN STUDENTS
(Adapted from Thorndike, *Educational Psychology*, Columbia University Press, 1917.)

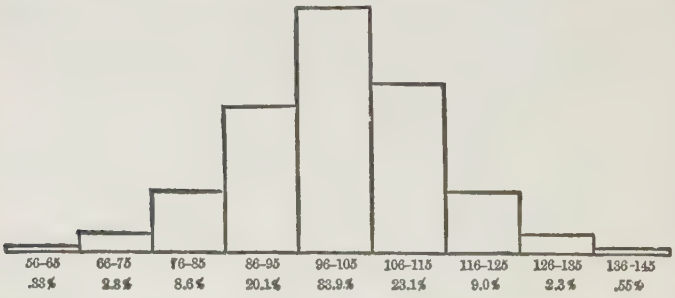

FIG. 5. DISTRIBUTION OF "INTELLIGENCE QUOTIENTS" OF 905 UNSELECTED CHILDREN, 5-14 YEARS OF AGE
(From Terman, *The Measurement of Intelligence*, Houghton Mifflin, 1916.)

in this case a very fine scale would no doubt be needed to bring out the characteristic curve of distribution.

In the case of mental traits the situation is quite similar. Some of the simpler mental traits such as sensory acuity and discrimination can be measured very accu-

rately. The results show a distribution of these capacities approximating the normal curve. Some of the more complex mental traits have also been measured by somewhat less accurate methods with similar results. Figure 4 shows the distribution of "memory for digits" of women students, and Figure 5 shows the distribution of scores on an intelligence test. These scores are the intelligence quotients of 905 unselected children.

Many mental traits and functions have not yet been measured. No measuring scales have as yet been devised for such complex traits of temperament and character as emotionality, instinctive drive, honesty, and so forth. But it seems legitimate to assume that these traits are also distributed among the population at large in the same way. Since, therefore, wherever physical or mental traits have been measured they are found to be distributed more or less closely in conformity with the normal curve, we are justified in the hypothesis that all traits, mental or physical, are so distributed.

The meaning of abnormal.—We are now in a better position to understand the meaning of the term "abnormal." It means deviation from the norm or central tendency. But the question arises, how great must the deviation be before it may be called abnormal? There is no satisfactory answer to this question because variations from the central tendency are continuous, and there are no gaps in the frequency distribution. No matter where the dividing line is drawn between the normal and the abnormal, it will be equally arbitrary. It is therefore better to think of no hard and fast line separating the normal from the abnormal, but rather of different degrees of abnormality.

The curve of distribution indicates the range of individ-

ual differences, and the abnormal may be regarded for practical purposes as merely the more extreme differences. The term "abnormal" thus indicates the relation of the individual to the group. It may likewise sometimes indicate the relation of a temporary condition to the usual condition of the same individual. A marked departure from accustomed behavior is abnormal for the individual concerned. Such a departure is usually abnormal with reference to the group as well. Abnormal psychology is therefore closely related to the psychology of individual differences, but it treats of the more marked deviations from the central tendency.

This view of the abnormal has a number of important implications. In the first place, the abnormal includes the *supernormal* as well as the *subnormal,* since the deviations may be above as well as below the central tendency. Genius is thus as abnormal as stupidity, exceptional memory capacity as abnormal as amnesia, and hyperemotionality as abnormal as deficiency in emotional responses. It is probable that the abnormal should also include, in addition to the supernormal and subnormal, a third category which we may call "paranormal";[1] for an individual may not only react very intensely or very weakly to a situation, but he may also exhibit an unusual or false reaction in that situation. Strictly speaking, paranormal may perhaps be reducible to the categories of very much or very little, but it is convenient, at least provisionally, to group this type of abnormality into a separate category.

Secondly, the abnormal must not be confused with the pathological or morbid. The abnormal includes the pathological, but there are many abnormalities that can in no

[1] This hybrid word may be justified by its significance and euphony.

sense be regarded as pathological. These are merely idiosyncrasies, or marked individual differences, and represent constitutional factors of a nonpathological nature. For example, extreme stubbornness is abnormal as well as catatonic negativism, peculiar mannerisms as well as the stereotyped responses of dementia præcox, unusual egotism as well as the delusions of grandeur of the paranoiac, marked grouchiness as well as epileptic ill humor, and in general any important deviation from the central tendency as well as deviations that are pathological in origin. The special branch of abnormal psychology which treats of pathological abnormalities is called psychopathology.

Thirdly, the abnormal must not be identified with the undesirable. Some abnormalities may be highly desirable, others may be undesirable. For example, genius is usually regarded as desirable, as is also exceptionally good memory, or keen sensory discrimination, whereas stupidity or marked forgetfulness are usually regarded as undesirable. The abnormal and the undesirable are really in no way related, in spite of the popular notion to the contrary. These conceptions belong to two different universes of discourse, the one scientific and the other ethical.

Is everyone abnormal?—In attempting to answer this question, it is important to keep in mind the statistical point of view and the quantitative meaning of the term "abnormal." Every individual personality may be regarded as being made up of numerous mental and physical traits. It used to be supposed that if a person possessed a great deal of one trait he must necessarily possess very little of some others. So, for example, if he were a good mathematician he must necessarily be a poor linguist, and vice versa. This view may be called the "theory of the compensation of traits." The results of

statistical studies in psychology have proved this theory false, and have substituted for it the "theory of the correlation of traits."

Correlation of traits means correspondence in the amounts of the traits, or the tendency of the traits to vary in the same way. Thus height and weight are correlated, for tall people are in general heavier than short people. This correlation is, however, not a perfect one, since some short people are heavier than some tall ones. Similarly, it has been shown that ability in mathematics and ability in language are correlated. In other words, students who rate high in mathematics are in general more likely to rate high in language than students who are poor in mathematics. In this case the correlation is low since a considerable number of students are good in one subject and poor in the other.

Methods have been devised for measuring the degree of correlation between traits. These methods may be found in any book on statistics,[2] and will not be described here. The amount of correlation determined by these methods is expressed numerically, as a coefficient of correlation. A perfect positive correlation is indicated by the coefficient + 1.00; absence of correlation by 0; and perfect negative correlation by —1.00. A perfect positive correlation means an exact correspondence in the amounts of the two traits. For example, if the correlation between ability in mathematics and ability in language were perfect, the students of these subjects, when arranged in order of merit, would have exactly the same rank in each subject. Such, however, is not usually the case. The correlation is positive but imperfect, and the

[2] For example, A. S. Otis, *Statistical Method in Educational Measurement* (World Book Co., 1925).

coefficient would be probably not over + .40. The theory of compensation among traits implies negative correlation. If it were correct, the orders of merit in the two subjects would be reversed and the coefficient of correlation would be negative. If there were no correlation whatever between the two abilities, the coefficient would be 0. Studies of the correlation of traits usually reveal positive correlations. These correlations are, however, never perfect. They are higher among some traits than among others, and many of them are quite low.

It follows that a person is likely to possess similar amounts of a considerable number of his traits. He is, however, also likely to possess less than this usual amount of some traits and more of others. This means that there is probably a normal distribution of the amounts of different traits within the same individual. The amounts of the different traits will cluster closely about a central tendency, but there will be larger amounts as well as smaller amounts of a few traits, and very large and very small amounts of still fewer traits.

The central tendency of the various amounts of an individual's traits may coincide with the central tendencies of these traits in the population at large, or may be above or below them, as in the case of the genius or the imbecile. In any case, each person not only possesses analogous amounts of a considerable number of traits but also has a very large amount of some traits, and a very little of others. This is equivalent to saying that *every person is abnormal in some respects;* he has his assets and his liabilities. However, this does not mean that every person is morbid or undesirable in some respects. It merely means that in certain traits he differs markedly from the average, and it has no implication of a pathological or ethical nature.

CHAPTER III

PHILOSOPHICAL FOUNDATIONS

Until quite recently psychology was regarded as a part of philosophy. Indeed, at one time all science was included within the broad range of philosophy. One by one, the sciences became independent of the parent subject, first the physical sciences, then the biological sciences, and, last of all, psychology. Psychology is thus the youngest of the sciences, and like the newly emancipated youth, frequently makes exaggerated claims with reference to its status and achievements. One of these claims is that psychology is now an exact science comparable to physics or chemistry, or at least to the other biological sciences.

This claim is only in part justified. It is true that psychology since the middle of the last century has adopted a scientific method of approach. According to this method, it proposes to begin with a study of facts, particularly facts manifested in laboratories under controlled conditions. As a consequence of this method, some results which may be regarded as exact have been achieved, and it is not our intention to belittle the importance of these achievements.

The fact, however, remains that the great majority of problems in psychology are not yet solved, and that conclusions reached or statements made with reference to these problems are still theoretical and highly speculative. This is just as true of the work of the behaviorists as

of the introspectionists. The behaviorists, as a rule, emphasize very greatly their scientific method and the exact nature of their results; and yet the behaviorists vie with the philosophers in the theoretical and speculative nature of their writings.

Moreover, it seems obvious that no science can be regarded as very exact so long as it is possible to have "schools" representing different standpoints within that science. There is still much controversy, among schools as well as among individuals, in psychology with regard to many specific problems, such as the nature and extent of original behavior, the nature of intelligence, the factors influencing the formation of habit, and the psychology of feeling and emotion.

We must conclude, therefore, that although psychology has adopted the scientific method, its exact results are still rather limited in number. A large part of both behavioristic and introspective psychology is still speculative. As time goes on, psychology will become more and more exact and quantitative, but it seems probable that a great deal of introspective psychology will always remain speculative. At any rate, it is necessary at the present time to weigh opinions, and to attempt a reconciliation of divergent views on many topics. The truth is more likely to be found in such a reconciliation than in the prejudiced opinions of the extremists. While the extremists of the different schools may be honestly convinced of the exact scientific nature of their conclusions with reference to various speculative topics, the less prejudiced seeker for truth can scarcely fail to regard such diverse conclusions as mere opinions. Hence, a major task of the psychologist must be to weigh such opinions and to reconcile views. He should therefore be willing to admit

that psychology is still largely speculative and, consequently, closely related to philosophy.

The same is, of course, true to a very considerable extent of physiology, because the functions of many organs are still matters of controversy and speculation. For example, there is little exact knowledge but much speculation regarding the functions of the endocrine glands, the nature of the nerve current, and the causes of muscular response. This is really no criticism of either physiology or psychology, for speculation is a legitimate form of the search for truth. It is necessary, however, to face the facts as they are, and to accept the close relationship of such sciences to philosophy. In this chapter it is proposed to discuss some of the more important philosophical problems of psychology.

The mind-body problem.[1]—There is one fundamental problem of a highly speculative nature which is frequently avoided, or rather evaded, in elementary courses in psychology. This is the old but persistent problem of the relation of mind and body, or, more specifically, of consciousness and the nervous system. There is, of course, no final solution to this problem, but it is highly desirable, if not necessary, to adopt a satisfactory working hypothesis. For the behaviorist there is no mind-body problem at all, since he either denies consciousness altogether or refuses to study it. This amounts to a mere evasion of the problem, for consciousness is just as obvious a fact as behavior, and therefore demands consideration.

There are three current views regarding the relation-

[1] For a comprehensive survey of this problem, see William McDougall, *Body and Mind* (Macmillan, 1911). This book is in part a defense of interactionism.

ship of mind and body. These views should be duly considered and carefully weighed by the student of psychology. The first view is known as *psychophysical parallelism*. According to this view, consciousness and neural activity are two separate series of events or processes which occur together, or proceed side by side, but have no causal relationship. In other words, a conscious event such as an idea does not cause a change in the nervous system, nor does neural activity cause a conscious event. Consciousness and neural activity are parallel phenomena between which there is no interaction. This is a dualistic as distinguished from a monistic view regarding human personality; for the latter is regarded as consisting of a material body and a separate immaterial mind. It is a view frequently held by structural psychologists. But structural psychology may just as well be based upon other theories, such as the double-aspect hypothesis described below.

The chief objection to psychophysical parallelism is that it is difficult to see how two processes so invariably associated could be nevertheless completely independent. An analogy frequently given for psychophysical parallelism is that of two clocks which are independent but always keep the same time, the movements of one synchronizing perfectly with those of the other. But the problem remains, how did the mental and physical clocks become so synchronized in their activity? This, it is said, is due to "preëstablished harmony"; the two processes were started that way in the beginning. It is thus obvious that the theory of psychophysical parallelism raises more problems than it solves, and leads to rather bizarre and impossible conclusions. It was merely an attempt to avoid the equally absurd consequences of assuming a causal re-

lationship between mind and body, if these are considered as separate things.

The second current view regarding the relationship between mind and body is known as *interactionism*. According to this view also, consciousness and the nervous system are regarded as separate entities, but there is assumed a causal relationship between them. In other words, a conscious event such as an idea or a feeling causes a change in the neurons of the brain, and, vice versa, neural activity causes conscious events. This, it is claimed, is the common-sense view, and one that has a practical significance for the physician. Interactionism is like parallelism a dualistic theory, since it regards mind and body, consciousness and neural activity as separate and unlike entities—the one immaterial, the other material. It is the theory sometimes adopted by functional psychologists. Some of the functionalists believe that consciousness has a function, and that this function is to affect the body and cause behavior. Such a point of view implies interactionism. It is, however, possible to be a functional psychologist in the sense that one studies sequences and processes without being an interactionist.

There are numerous objections to interactionism, but the chief objection arises from an analysis of the concept of causality. Whether there is a causal relation between consciousness as an immaterial entity and the brain will depend on the meaning of "causal relation." In the first place, it is well to remember that the concept of causality was originally formulated with reference to physical sequences of events. It is thus a physical concept, and it is questionable whether it is legitimate to extend it to conscious processes if these are regarded as separate and distinct from the physical.

As a physical concept, causality implies more than an invariable sequence of events. Night invariably precedes day but night does not cause day. A causal relation implies, in addition to invariable sequence, a transformation of energy in the succession of events. Moreover, the total energy of the effect must be equivalent to the total energy of the cause or causes. In other words, in the physical sciences, A is regarded as the cause of B, if A invariably precedes B, and if the energy of A is transformed into and equivalent to the energy of B. This energy must be capable of exact measurement. Energy is also, of course, a purely physical concept. It means the quantitatively measurable capacity to work or to produce measurable physical change. It is therefore also questionable whether it is legitimate to apply this term to consciousness or mind when the latter is regarded as something separate, distinct, and immaterial. From this point of view it would be correct to speak of neural energy, since the nervous system is part of the physical world, but not of mental energy.

It follows from the above views of causality and energy that interactionism comes into conflict with the "law of the conservation of energy." According to this law, the sum-total of energy in the physical world remains constant. But, if a neural process causes an immaterial mental event such as an idea, some of the energy of the physical world to which the brain belongs passes at that moment out of it and is lost; and vice versa, if consciousness causes neural activity, a certain quantity of energy is at that moment added to the physical world.

It is, moreover, difficult to conceive how an immaterial entity can affect physical substance. Consciousness cannot cause movements in physical objects, such as

tables and chairs, and there is no more reason to believe it can cause movement in neurons just because they are small and concealed within the skull. Furthermore, it is difficult to ascertain where the limits of the assumed causal relationship lie, and consequently the interactionistic hypothesis is frequently a basis for cults that make far-reaching attempts to heal the body by producing an effect upon the mind. They argue that, if consciousness can produce one sort of physical effect, it may very well produce others of a more obvious nature. If it can move neurons in the brain, it can perhaps heal wounds or mend broken bones.

The third view regarding the mind-body relationship is the so-called *double-aspect theory,* or identity hypothesis.[2] This is in many ways the most satisfactory working hypothesis for both psychologist and physician. It is therefore adopted as a basis for the psychological system expounded in this book. According to the double-aspect theory, consciousness and neural activity are merely subjective and objective aspects of the same thing. The neural activity is the phenomenon as it appears, or might appear, to the external observer when investigating neural processes through behavior, or examining the brain under the microscope. Consciousness is precisely the same process, as it appears to the subject himself.

The double-aspect theory is thus a monistic theory. Mind and body are not two separate and distinct entities. There is only one process but it has two aspects. This is frequently illustrated by the example of a circle. The circumference of a circle is from the inside a concave

[2] H. C. Warren, "Outline of a Psychological Standpoint," *American Journal of Psychology,* 39 (1927), 23-41. This paper is a concise and clear statement of the double-aspect theory and its implications.

line, while from the outside it is a convex line, and yet there is only one line. This is, of course, only an analogy which illustrates in a suggestive way the fact that one thing may have two different aspects.

The double-aspect theory has certain important implications. It implies that introspection is a valuable method of obtaining information about neural processes. When the nature of these neural processes cannot be ascertained by objective means, some knowledge of them may still be derived from the introspections of the subject. These introspections give a description of the subjective aspect of the same thing that is studied objectively by other methods, and sometimes the introspective results run far ahead of the objective neurological findings.

It may be objected that the double-aspect theory is really materialistic, since it seems to make neural activity of fundamental importance. This is, however, not necessarily the case. The double-aspect theory is merely a working hypothesis regarding the relationship of two obvious sides of experience, namely, mind and body. It does not imply that one of these is any more fundamental than the other; nor does it imply any metaphysical view regarding the ultimate nature of the reality that may underlie both of these phenomenal aspects of experience. It is frequently convenient and may help towards directness of expression to refer to consciousness as an aspect of neural activity, but the latter may equally well be referred to as an aspect of consciousness. Strictly speaking, they are both aspects of some more fundamental process that is perceived objectively as neural activity and is experienced subjectively as consciousness.

In this connection it is, moreover, worth noting that

matter in recent years has lost much of its older material nature. The physicist has analyzed it into atoms which consist of electrons and protons. These electrons and protons appear to be some form of electrical or radiant energy. The exact nature of this energy is unknown, but at any rate it lacks the solidity and resistance ordinarily associated with matter. It is thus conceivable that it may manifest itself under certain conditions as matter and under others as consciousness. It is a possible theory that when electron-proton relationships and neural configurations attain a certain degree of complexity the organism in which they occur experiences consciousness.[3]

The double-aspect theory of mind-body relation also affords an exceedingly good basis for an eclectic attitude in general psychology. The contributions from all the different schools of psychology can be included in a psychology with this foundation. The behaviorist studies only one aspect of the psychophysiological organism, and he makes an important and valid contribution as far as he goes. The thoroughgoing introspectionist studies only the other aspect and his contribution is also valid from that point of view.

The contributions made by the different schools of introspectionists may also be included. Those who regard the task of psychology as merely the analysis of consciousness have given us some interesting and valuable results. Those who take a more dynamic point of view, and study chiefly the sequences of mental processes and the motivation of behavior, have likewise contributed much to our psychological knowledge. Even the psycho-

[3] For an interesting discussion of this hypothesis, see Morton Prince, "Why the Body Has a Mind and the Survival of Consciousness after Death," *Mind,* 37 (1926), 1-20.

analysts, notwithstanding their somewhat fantastic ideas regarding an unconscious mind, have given us a great deal of valuable information with reference to such facts as mental conflict, repression, overcompensation, and the various fundamental "drives" that determine behavior. Thus, valuable contributions from all sources can be included in a psychology approached from this point of view.

In accordance with the double-aspect theory, all psychological traits or functions will have their *subjective* and *objective* aspects, and wherever possible they should be treated from both points of view. Instinct, for example, is subjectively experienced as impulse or "drive," while it is objectively observed as motor mechanism or pattern reaction. Some of the topics can, however, be more readily treated from one point of view than the other. Habit can be more readily treated objectively, while perception and emotion can be more readily treated subjectively. This merely means that the other aspect is not so obvious or so well known. In this book both aspects of each trait will be described whenever possible, but in some cases more emphasis will be given to the subjective aspect, and in other cases to the objective.

Explanation in psychology.—Psychology is not only a descriptive science, it also aims to be explanatory. To explain anything means to give its causal antecedents. Explanation presents no theoretical difficulties to the behaviorist because for him the causal sequence from situation to response is entirely a physical sequence. As previously pointed out, he has nothing to do with consciousness and ignores the problems that arise because of its existence. The interactionist, as we have shown, takes the point of view that mental and physical events are two

separate but interacting series. Mental events are caused by physical changes, and some physical changes are caused by mental events. The unsatisfactory and untenable nature of this view has already been referred to.

The psychophysical parallelist takes a rather unique position on the problem of explanation. He also believes that mental and physical events constitute two distinct series, but they are not causally related. A mental event is not caused by a physical event, but it is nevertheless explained by giving its physical correlate. In other words, explanation in psychology is different from explanation in other sciences. Here explanation does not consist in finding causes, but in finding correlates that are not causes.

The standpoint of the double-aspect theory on the problem of explanation is more satisfactory. In this theory the point of view is taken that, since causality and energy are both physical concepts, it is best to think of the causal sequence as being always on the physical side. Although mental events such as ideas and feelings occur in succession, it is not strictly legitimate to regard this succession as a causal one. In other words, an idea does not cause a succeeding idea. The process which appears in consciousness as an idea is objectively complex neural activity. This neural activity does cause succeeding neural activity which is experienced subjectively as a succeeding idea. Similarly a feeling such as pleasurable experience does not cause bodily changes. The physical counterpart of the feeling does, however, cause such changes. The psychologist must explain both behavior and consciousness. The exponents of the double-aspect theory explain behavior in the same way as the behaviorist does, namely, along physical lines. They explain conscious events, however,

by giving their neural aspects, and then tracing the further causal sequence on the physical side.

In practice, however, because of our lack of knowledge of neural processes, it is not always possible to indicate the physiological counterpart of a mental event. In such cases it may be necessary to proceed as if the mental event itself caused a succeeding physical one. This is legitimate if it is understood that the mental event is merely an aspect of neural activity substituted for the latter when it is not known. Similarly, one may speak of mental energy when he really means neural energy. From this point of view, psychological explanations in terms of consciousness are only tentative, but are necessary in the present undeveloped state of the science of neurology. Perhaps, if we knew absolutely all that is going on in the brain—the changing neural patterns, the molecular transformations, the electron-proton relationships—we could dispense altogether with mental explanations. Psychology as a study of consciousness would then become merely descriptive and only an interesting pastime. The study of behavior would constitute the whole of the science of psychology. This, however, is not likely to happen for many years to come.

An illustration of the necessity for accepting tentatively mental explanations is the frequently occurring case of some form of indigestion following worry, anxiety, or mental conflict. Strictly speaking, and *in theory,* the worry as a conscious process does not cause the indigestion. It is rather those stresses and strains in the central and peripheral nervous system, which are probably the physical counterpart of the worry, that cause the indigestion. We do not, however, know the nature of these supposed stresses and strains, and must therefore in practice act

as if the worry caused the indigestion, and guide our therapeutic procedure in accordance with this view.

This double-aspect theory thus enables the student and the practitioner to reach a sane compromise between total neglect of mental factors and their overemphasis; thus avoiding, on the one hand, faulty diagnosis due to neglect of important factors, and, on the other, medical charlatanism akin to Christian Science. The medical man who takes the point of view that every symptom must have a physical cause is theoretically right, but he would be wrong in concluding that introspective psychology has therefore no value in medical practice. In the present state of our knowledge it is necessary to distinguish between what is theoretically sound doctrine and what is sane and sensible practice. We can thus agree with the view that a mental process cannot in theory cause a physical symptom, but the neural aspect or correlate of the process *can* cause it, and since this neural process is not known we must act *as if the mental process caused it*. Mental processes are, however, *not separate things* which act upon the physical body, and herein the present view differs from that of Christian Science and other forms of interactionism.

The explanation of mental events is thus always in neurological terms, but it has been suggested that mental events may be explained by referring to endocrinological and perhaps other physiological processes such as general metabolism. It seems probable, however, that consciousness is not directly associated with these physiological processes, but that it is always an aspect of neural activity, and that such physiological processes only affect consciousness in so far as they affect neurological processes. There is, on the other hand, a view known as the

organismic hypothesis, according to which consciousness is associated with the total organism and its activity rather than with the specific part of the organism known as the nervous system. This hypothesis, however, does not commend itself to most psychologists.

A discussion of explanation in psychology requires some reference to the so-called *unconscious* or *subconscious* mind, since the latter is frequently made use of as an explanatory principle. In this connection it is important to emphasize the distinction between fact and theory. It is a fact that much of normal behavior, and many symptoms of mental disease, are caused by unconscious factors, in the sense that these factors are outside of consciousness. The subject or patient is not aware of them. To speak of the unconscious motivation of behavior in this sense is, therefore, merely a reference to a fact. On the other hand, the nature of these unconscious factors, whether they are physical or mental, is merely a matter of opinion. According to one theory, the unconscious factors which determine behavior or symptoms are themselves mental. This is the theory of an unconscious or subconscious mind. According to another view, these unconscious factors are purely physical, and either neurological or more broadly physiological.

For practical purposes, it really makes very little difference which theory is held. It does, however, make a difference whether one recognizes the important fact that behavior is motivated and symptoms are determined by unconscious causes, that is to say, by causes outside of the patient's consciousness. Modern investigations have shown what some of these causes are, and have indicated the possible nature of others. In describing them, it is often convenient to use psychological terms, such as

complex, wish, and impulse, but this does not mean that the unconscious is necessarily mental. A physical account could be given in terms such as neural pattern, neural trace, neural energy, and neural inhibition and facilitation, if we knew more about neurology. It is thus possible to accept the fact of unconscious motivation, and to go very far towards an understanding of the character and operation of unconscious factors, without accepting the "theory of an unconscious mind." A more detailed account of the unconscious is given in Chapter V.

CHAPTER IV

THE MECHANISM OF BEHAVIOR

It has been pointed out that psychology is in part the study of behavior and in part the study of consciousness. All behavior may be regarded as response to stimulation. This response involves sensitive receiving organs, transmitting organs, and organs of response. There must be within the organism numerous connections or bonds which determine the character of the response to a specific stimulus or to a total situation. These connections are frequently referred to as "stimulus-response" (S-R) bonds. It is obvious that, if one wishes to understand the nature and causes of behavior, it is necessary to have some knowledge of the various parts of the responding mechanism and their interconnections; just as it is necessary to know something of the structure of any machine, if one wishes to understand how it works.

The student of consciousness also must know something of the behavior mechanism, for the organism is a psychobiological unit and consciousness is merely the subjective aspect of activity in the adjusting mechanism. It is not necessary in a book on psychology written especially for medical students and practitioners to discuss the behavior mechanism in any great detail. A general knowledge of anatomy, physiology, and neurology may be assumed. We shall therefore merely outline certain aspects of the subject that have a special bearing on the problems of psychology.

The evolution of the behavior mechanism.—The behavior mechanism consists of three parts, namely, *receptors, adjustors* or *connectors,* and *effectors.* The receptors are the sensitive receiving organs, the adjustors are the conducting or transmitting organs, and the effectors are the responding organs. It is interesting to speculate on the phylogenetic origin and development of these organs. It seems very probable that, contrary to one's first superficial views on the matter, the order of development in the course of evolution was first, effectors, second, receptors, and third, adjustors.[1] The simplest unicellular organisms are not differentiated in this respect at all. Any part of such an organism may act as receptor, adjustor, or effector. In the multicellular organisms, a differentiation and specialization of function takes place, and the first of this trio of organs to become thus developed appears to be the effectors. The common sea sponge represents such an "effector organism." It has no specialized organs for reception or transmission, but it has organs specialized for response.

The next stage in the evolution of the behavior mechanism was the development of receptors, or sense cells. These at first originated in close proximity to the effectors and functioned as "triggers" to set off the response more quickly. The sea anemone represents a "receptor-effector organism." Each tentacle is an effector which has its own receptor cells, and there is at this stage very little evidence of the presence of a special conducting system.

The next step in evolution was the differentiation and specialization of certain cells for the transmission of stimulation more quickly from the receptor to the effec-

[1] G. H. Parker, *The Elementary Nervous System* (Lippincott, 1919), pp. 199-214

tor. This resulted in a still more rapid adjustment of the organism to the stimulus. The common jellyfish is a very simple form of a "receptor-adjustor-effector mechanism." In this case, the adjustor takes the form of a "nervous net," that is, it is an uncentralized system of nerve fibers connecting the various receptors of the organism with its effectors.

The evolution of the adjusting mechanism after this stage consists chiefly in an increasing centralization of the nervous system. This *centralization* means the accumulation of cell bodies in a special center or centers, and the development of long cell processes which extend to the periphery of the organism. The nervous system of the earthworm represents an early stage in the process of centralization. Here each segment has its own nerve center or ganglion, and is consequently relatively independent of the other segments. Thus, each segment may react as a unit, and it is possible to have antagonistic responses in the different segments, such as attempts to move in opposite directions at the same time. The earthworm is thus the original prototype of a dissociated personality.

There is, however, even in the earthworm, a special development of the superesophageal ganglia in the head segment. As we descend the phylogenetic scale we find a greater and greater development of these ganglia until at last they become the brain of man. There are various causes which operate to determine a special development of the ganglia in the head segment rather than in any other. Of chief importance is the fact that this segment precedes the others in locomotion. It has first contact with the new environment. As a consequence the major sense organs are developed in the head segment where

they are specially needed; and the brain, that is, the chief nervous center, develops in close proximity to these major sense organs.

The evolution of the behavior mechanism would seem to indicate that the organism is primarily a responding mechanism, and that the sense organs and the nervous system are merely organs to facilitate response. The brain is thus primarily a transmitting and integrating system, and is only secondarily the organ of thought. When the neural interrelations attain a certain degree of complexity, the organism in which they occur experiences consciousness, and this is the beginning of thought. The different parts of the behavior mechanism will now be discussed in the order of their development.

EFFECTORS

The effectors are the organs of response. Like all other organs, they consist of cells. In this case, the cells are those which have been differentiated in the process of evolution, and specialized for response. There are in the human organism four different kinds of effectors, namely, striped muscles, smooth muscles, duct glands, and ductless glands. There are other kinds of effectors found in some of the lower organisms, but these need not be considered here.

Striped muscles.—Striped muscles are also called skeletal muscles since they are attached to the bony framework. They are the muscles which are chiefly involved in all overt and easily observable responses. They are supplied mainly by nerve fibers from the cerebrospinal system, but they also contain some nerve processes from the autonomic system, which are probably concerned in muscle tonus and posture. Striped muscles react more

quickly than smooth muscles; and there are differences among individuals in the speed, strength, and endurance of these muscles. On the other hand, some of the individual differences in motor capacity are dependent upon the nervous control of the muscles rather than upon the muscles themselves.

The skeletal muscles are arranged for the most part in antagonistic pairs, and it has been shown by Sherrington and others that there is a *mutual innervation of antagonistic muscles*.[2] When a muscle contracts, the opposite one relaxes, and just as the contraction is due to an addition of nerve current, so the relaxation is due to a positive shutting off or inhibition of current. This facilitation and inhibition of antagonistic muscles is thus a function of the central nervous system, and is probably dependent upon the relationship of motor neurons in the ventral horns of the spinal cord.

Smooth muscles.—Smooth muscles are also called visceral muscles since they are found chiefly in the internal organs and have to do with the internal adjustments of the body. The smooth muscles are supplied by nerve fibers from the autonomic nervous system. This system is not so highly centralized as the cerebrospinal system, and consequently the smooth muscles have a greater degree of independence. In an older terminology they were therefore called involuntary muscles. The smooth muscles are involved in the functions of special organs and in the internal adjustments of the organism. They are therefore of interest primarily to the physiologist. But they are also of interest to the psychologist, since they play an important rôle in feeling and emotion.

[2] C. S. Sherrington, *The Integrative Action of the Nervous System* (Yale University Press, 1906).

Duct glands, or glands of external secretion.— Glands in general are organs which function somewhat like chemical laboratories. They separate from the body-fluids chemical substances out of which they build up new chemical combinations. This process is called secretion. The glands of external secretion, or duct glands, carry the substances secreted through canals or ducts into some body cavity where they have a function to perform, or on to the surface of the body as in the case of the sweat glands. Some of the more important duct glands are the salivary glands, liver, pancreas, other digestive glands, and sweat glands.

Saliva is secreted in response to the taste or smell of food. This is the original stimulus for the salivary reflex, but as a result of experience the response may be elicited by other associated stimuli, such as the appearance of food or the ringing of a bell. When a reflex response is elicited by such a substituted stimulus, it is called a "conditioned reflex." The secretion of saliva was the reflex first to be conditioned in an experimental situation in Pavlov's laboratory.

The liver and the pancreas are glands of both external and internal secretion. As duct glands they secrete bile and pancreatic juice which assist in the process of digestion. Other digestive glands have similar functions. These glands respond to the presence of food and to the products of internal secretion, and they may become conditioned to other stimuli. They are facilitated by parasympathetic and inhibited by sympathetic activity. The sweat glands respond to temperature, and also to excitation of the sympathetic nervous system such as occurs in fear. The duct glands are therefore of interest to the psychologist as well as the physiologist. Their activity

depends in part upon experience, since they may be conditioned. Moreover, their harmonious activity is essential to the feeling of well-being, and disturbances of their function may produce a general feeling of malaise.

Ductless glands.—Ductless glands are often called glands of internal secretion, or endocrine glands. The substances they secrete are thrown directly into the blood stream and thence are carried to all parts of the body. These substances are called *autacoids,* and they produce effects upon the body similar to the effects of drugs. In general, they have either an exciting or an inhibiting effect upon certain bodily functions. There are thus two kinds of autacoids, *hormones* or exciting autacoids, and *chalones* or inhibiting autacoids. Some glands, such as the pancreas and sex glands, are both glands of internal and external secretion, but there are many glands of internal secretion alone. The most important of these are the adrenal, thyroid, parathyroid, thymus, pituitary, and pineal glands.

The *adrenal glands* secrete a substance called adrenalin, adrenin, or epinephrin, which when thrown into the blood stream produces the following results: First, it stimulates the circulation, increases the blood pressure, and causes a redistribution of the blood supply from the viscera to the skeletal muscles. Secondly, it stimulates the liver to give up its glycogen which constitutes the main supply of food for the muscles. As a result of these two effects, fatigue is removed, for the muscles get an extra supply of food, and the accumulated waste products are washed out by the accelerated circulation. Thirdly, adrenalin increases the coagulability of the blood, and thus prevents profuse bleeding from an injury. Fourthly, adrenalin reacts upon the sympathetic system and accelerates all the processes due to sympathetic stimulation. It

has been shown that adrenalin is thrown into the blood stream with the above results in fear, anger, and intense pain. Fear and anger are the responses that occur in a dangerous situation, and it will be seen that the function of adrenalin is to prepare the organism for the emergency.[3]

Glands may vary in their function at different times and in different persons. These variations may be either an excess or a diminution of their normal function. In hyperadrenalism there is an exaggeration of muscular activity, emotivity, and general restlessness, while in hypoadrenalism there is increased muscular fatigability and decreased responsiveness.

The *thyroid glands* secrete a substance called thyroxin or thyrin. This substance has a stimulating effect upon both mental and bodily growth and development. In hyperthyroidism there occur nervousness, anxiety, and palpitation. Hyperthyroidism may occur with or without hypertrophy of the glands. If it is accompanied by hypertrophy of the glands it is called exophthalmic goiter. Hypothyroidism has two results, depending upon whether it is congenital or acquired. Congenital hypothyroidism results in cretinism, which is characterized by a stunted and peculiar body growth as well as by mental defect. Hypothyroidism occurring in adults results in a condition known as myxedema, characterized by well-known physical changes as well as by the retardation of all mental processes. Near the thyroid glands are a pair of small glands known as the *parathyroids*. These are supposed to have something to do with the removal from the body of certain toxic products of metabolism, and also with the regulation of calcium metabolism.

[3] W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear and Rage* (Appleton, 1920).

The *thymus gland* is found in infants and children, but it atrophies and usually disappears at puberty or early adolescence. This suggests that it may secrete an inhibiting autacoid which prevents the premature development of sexual characteristics. The presence of infantile physical and mental characteristics after the age when they usually disappear may sometimes be accounted for by a persistent thymus gland.

The *pituitary gland* is situated on the ventral side of the brain stem. This gland has two parts, an anterior lobe and a posterior lobe. The anterior lobe is supposed to be concerned in the control of growth, particularly the growth of the bones. If the function of this lobe is disturbed, it may result in dwarfism, or in gigantism and acromegaly. The pituitary gland is likewise concerned in the regulation of physical rhythms and periodic functions.

The *pineal gland* is on the dorsal side of the brain stem. Its function is not well known. It is an active gland only during childhood and may therefore have something to do with the regulation of growth and development. This gland is interesting historically, for some of the medieval philosophers regarded it as the "seat of the soul."

The *sex glands* or gonads function as glands of internal secretion as well as in reproduction. The hormone produced by the sex glands stimulates the development of the secondary sex characteristics. These are the changes in voice, body contour, hair growth, and so forth, which occur in adolescence. In adult life, this hormone may be an important factor in stimulating other glands and the whole organism to greater activity. It may have an effect upon instinctive drive, and assist in giving life its zest.

The glands of internal secretion are all very closely interrelated so that the function of any one gland has an

effect upon the functions of the others. This is what might be expected since the autacoids produced by them are carried by the blood stream throughout the whole body. It follows that a disturbance of function in one gland may result in disordered functions in others. It is thus extremely difficult to determine the exact function of any particular gland, and the science of endocrinology is still in its infancy.

Ductless glands are of special interest to the psychologist because they play an important rôle in feeling and emotion. Emotional outbursts such as fear or rage are accompanied by glandular hyperactivity, and the milder affective states called moods are also probably accompanied by less marked glandular variations. Moreover, there is also a glandular theory of temperament according to which the type of temperament depends upon the relatively dominant gland. This theory is not yet generally accepted, but there is no doubt that glandular activity plays an important part in all affective experiences.

RECEPTORS

Receptors are cells which have been differentiated in the process of evolution and specialized in their sensitivity to stimuli, or in the reception of impressions. A *stimulus* is a physical change which produces an effect upon receptors. These stimuli may be either outside the organism or within the organism. For example, ether vibrations as of light, air vibrations as of sound, and gaseous emanations are stimuli outside the organism, while various muscular and visceral changes constitute stimuli within the organism. Since different receptors are sensitive to different stimuli, the receptors are essentially selective organs and lead to selective responses of the

organism to its environment. The receptors are the sensitive cells which constitute the most important part of a sense organ.

The definition and classification of the sense organs will depend upon the criterion adopted. Four different criteria of a sense have been suggested. The first is the *psychological* criterion. This is the criterion of introspective evidence. If sensations are distinctly different, different sense organs must be involved. The second is the *physical* criterion. According to this criterion, the senses are classified in accordance with their physical stimuli. An objection to this criterion is that some physical changes, such as magnetic and electrical phenomena, have apparently no corresponding sense organs. The third is the *anatomical* criterion. According to this criterion, the sense organs are differentiated by their structure, and consist of groups of similar receptors such as the cones of the eye and the gustatory cells of the tongue. The fourth is the *physiological* criterion. According to this criterion, the sense organs are differentiated by their function, that is, by the responses and adjustments to which they lead. The following classification of sense organs into exteroceptors, interoceptors, and proprioceptors is based chiefly upon the physiological and physical criteria.

The exteroceptors.—The exteroceptors are receptors or sense organs which are excited by stimuli outside of the body. They have therefore an important function to perform in the adjustment of the organism to external conditions. The exteroceptors may be subdivided into two groups: the distance receptors and the contact receptors. The *distance receptors* are the sense organs which respond to stimuli arising from objects at a distance from the body. The chief distance receptors are the eye, the ear,

and the olfactory and thermal senses. The actual receptors of these sense organs are the rods and cones of the retina, the hair cells of the organ of Corti in the internal ear, the olfactory cells in the upper nasal cavity, and small cells in the skin in the case of the thermal sense. A complete account of the structure and function of these and other sense organs may be found in any textbook of physiology, and will not be given here.

The *contact receptors* are sense organs which respond to stimuli from objects in contact with the body. The chief contact receptors are the organs of touch in the skin, the organs of deep pressure in the subcutaneous tissues, and the organs of cutaneous pain. The organs of touch are the hair bulbs and the Meissner corpuscles. The organs of deep pressure are not definitely known, but they may be Pacinian corpuscles and muscle spindles. There are no special receptor cells for pain. The organs for cutaneous pain are merely the free nerve endings in the skin.

The interoceptors.—The interoceptors are the sense organs excited by stimuli arising within the organism, chiefly within the viscera. They have therefore an important function to perform in connection with the mutual interrelation of the organs and the internal adjustments of the organism. One of the special senses is sometimes classed as an interoceptor, namely, the sense of taste. It might, however, be regarded as a contact receptor. The actual receptors in this case are the gustatory cells in the taste buds of the fungiform and circumvallate papillæ of the tongue. In everyday experience the sensations of taste and smell are difficult to distinguish, and what are usually referred to as tastes consist chiefly of smells. Nevertheless, smell and taste belong to different

general classes of sense organs. The organ of smell is a distance receptor, while the organ of taste is a contact receptor or an interoceptor.

The other interoceptors are of a more general and less highly specialized nature. Some of them are as follows: organs of hunger and thirst, organs of visceral pain, and organs giving rise to respiratory, circulatory, sexual, and many obscure abdominal sensations. The exact nature of the receptors involved in these cases is not very well known. The stimulus in the case of hunger is a periodic tonic contraction of the muscles of the stomach, and in other cases also it appears to be some form of smooth muscle activity. The sensory nerve endings are stimulated by this activity. The sensations derived from these interoceptors constitute an important part of feelings and emotions, such as the feelings of well-being and malaise, and the emotions of anger and love.

The proprioceptors.—The proprioceptors are sense organs which are stimulated by the movement and position of the whole body or its parts. These sense organs are involved in the coördination and regulation of bodily response. There are two groups of proprioceptive organs, namely, the kinesthetic senses, and the senses of the semicircular canals and vestibule of the internal ear.

There are three *kinesthetic* senses: the muscle sense, the tendon sense, and the joint sense. In the muscles, tendons, and joints there are receptor cells or sensory nerve endings which are stimulated by movement. These sense organs do not function in the initiation of movement but rather in the regulation of movement already begun. The importance of this regulative function is indicated by the very large relative size of the dorsal columns of the spinal cord which are made up entirely of afferent

fibers that transmit nerve currents from these sense organs to the medulla. The sense organs in the *semicircular canals* and *vestibule* of the internal ear are stimulated by movements of the head and therefore of the whole body. These organs are closely connected with the cerebellum, and are involved in that form of coördination known as the maintenance of equilibrium.

The number and relative importance of the sense organs.—The exact number of the sense organs is uncertain, but there are many more than the five of the traditional literature. In addition to the four major senses, there are four separate senses in the skin, three kinesthetic senses, two proprioceptors of the internal ear, and many less definite interoceptors. The question is sometimes raised, which are the more important sense organs? The answer to this question will depend upon the point of view that is taken at the moment. The exteroceptors are, of course, the most important sense organs for adjustment to external conditions and for knowledge of the external world. On the other hand, the proprioceptors are of fundamental importance in the regulation of behavior and the maintenance of bodily equilibrium, while the interoceptors are important for internal adjustments and for affective experience. Both proprioceptors and interoceptors play an important rôle in the consciousness of unity and personal identity, since they provide a relatively permanent conscious background in a changing world.

There are considerable differences in the capacity and acuity of the sense organs both from sense to sense, and from individual to individual. These differences may have far-reaching effects on the views and attitudes of the persons concerned. This is particularly true when the deviations are sufficiently marked to be regarded as ab-

normal. A superior sensory acuity is an asset in certain fields of endeavor, while a defective sense organ is a handicap which may prevent proper development, or lead to some form of overcompensation. The nature of such overcompensation will be discussed in a later chapter.

It seems probable that sensory acuity is due to original nature and cannot be materially affected by experience. That is to say, training does not increase sensory acuity. This is illustrated in the well-known case of Helen Keller who is both blind and deaf and has yet achieved great success in life by utilizing the other senses. It has been found, however, that these other senses are in her case really no more acute or sensitive than those of the average person.[4] Her success is rather due to the fact that she has learned to attend to the stimuli affecting these other senses, and has built up numerous associations pertaining to these impressions. In other words, while the senses themselves do not become more acute with practice, the neural connection with these senses may undergo a very great amount of development.

THE ADJUSTOR OR NERVOUS SYSTEM

The central part of the behavior mechanism is the nervous system. It is customary to regard the nervous system as consisting of two parts, the cerebrospinal system, and the autonomic system. The major parts of the cerebrospinal system are the peripheral sensory and motor nerves, the spinal cord, medulla, pons, cerebellum, midbrain, thalami, corpus striatum, and cerebral cortex. The gross features of the nervous system are shown in Figure 6. For further details and description, the reader

[4] F. A. Tilney, "A Comparative Sensory Analysis of Helen Keller and Laura Bridgman," *Eugenics News*, 13 (1928), 156-162.

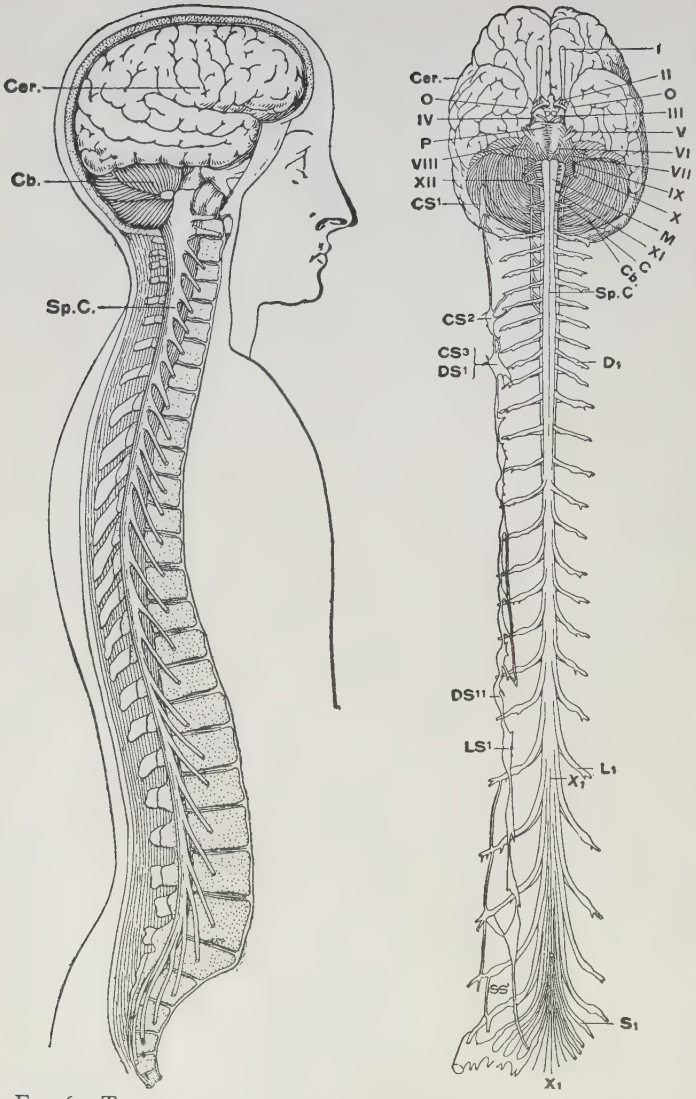

FIG. 6. THE FIGURE ON THE LEFT SHOWS THE GENERAL RELATIONS OF THE CENTRAL NERVOUS SYSTEM TO THE BONES OF THE SKULL AND SPINE. THE FIGURE ON THE RIGHT SHOWS THE NERVOUS SYSTEM FROM THE VENTRAL SIDE, ILLUSTRATING ITS CONNECTIONS WITH THE CRANIO-SPINAL NERVES AND WITH THE SYMPATHETIC GANGLIA.

should consult one of the many textbooks on this subject. Here it is proposed to refer only to certain characteristics or aspects of the nervous system, which are of special interest and significance for psychology. Some of the views presented are controversial, but the scope of this book will not permit adequate discussion of the different sides of the controversy, and the statements are thus of necessity occasionally more dogmatic than they should be.

Structural units of the nervous system.—The structural units of the nervous system are neuroglia cells and neurons. The *neuroglia cells* are not transmitting cells or nerve cells proper. They are rather connective-tissue cells which constitute a structural framework for the central nervous system. These cells make up a considerable proportion of so-called nervous tissue, and the proportion is larger in some brains than in others. In certain mental diseases there appears to be a proliferation or overdevelopment of neuroglia cells. In fact, it sometimes appears as if neurons were converted into neuroglia cells.

The *neurons* are the real transmitting cells. Each neuron consists of a cell body, an axon which transmits the nerve current away from the cell body, and dendrites which transmit towards the cell body. The sensory neurons are atypical in that they have no dendrites but have two axons. They are called bipolar cells. An axon is a cylindrical process usually surrounded by a myelin or medullary sheath which is supposed to have an insulating function. Axons vary from about a millimeter to over a meter in length. The dendrites are short, much-branched

(See references opposite.)

Cer., the cerebral hemispheres; *Cb.*, the cerebellum; *O*, the olfactory centers; *P*, the pons Varolii; *M*, the medulla oblongata; *I-XII*, the cranial nerves, *Sp.C.*, the spinal cord; *C*, D^1, L^1, S^1, spinal nerves; X^1, filum terminale; CS^1, CS^2, CS^3, DS^1, DS^{11}, LS^1, SS^1, ganglia of the sympathetic. (From Angell, *Psychology*, Henry Holt, 1908.)

processes and have no myelin sheath. The so-called gray matter of the brain is made up of cell bodies and dendrites, while the white matter consists of the axons. The millions of neurons that make up the nervous system are separate and distinct units. They are separated from one another by *synapses*. At the synapse, the terminal arborization of the axon comes into relation with the dendrites of an adjoining cell, but there is no continuity between these processes.

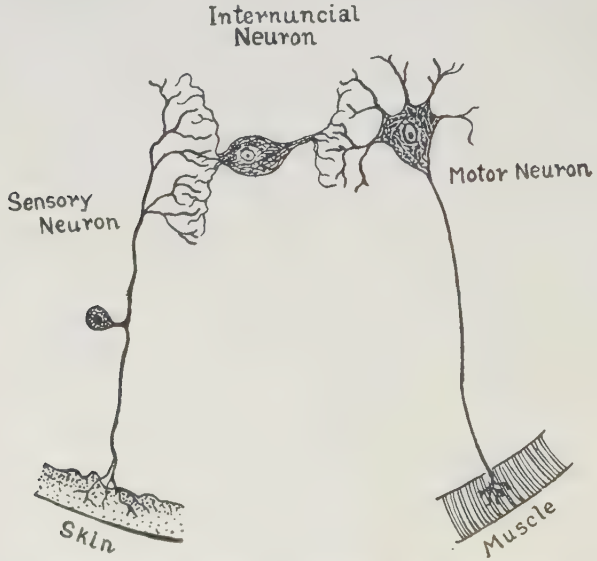

FIG. 7. THIS SHOWS A TYPICAL BEHAVIOR UNIT, CONSISTING OF RECEPTOR, EFFECTOR, AND REFLEX ARC OF THREE NEURONS

Functional units.—The above structural unit of the nervous system must be distinguished from the functional unit which is the *reflex arc*. A reflex arc may in theory consist of only two neurons, a motor neuron and a sensory neuron; but in the human nervous system it is probably never quite so simple. Here it consists of at least

three neurons usually referred to as sensory, association or internuncial, and motor neurons. A reflex arc consisting of three typical neurons is illustrated in Figure 7, and more diagrammatically in Figure 8. In the latter figure, a neuron is represented by an arrow and the direction of the nerve current by the pointing of the arrow.

The functional unit of the nervous system is not the complete unit of behavior. For the behavior response it is usually necessary to have in addition to the reflex arc,

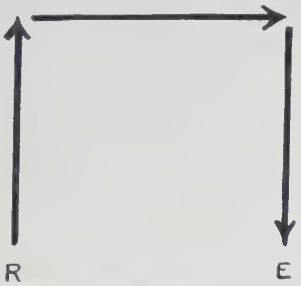

FIG. 8. DIAGRAMMATIC REPRESENTATION OF BEHAVIOR UNIT

R, receptor; *E*, effector; *three arrows*, reflex are of three neurons.

a receptor cell and an effector organ. These are indicated by the letters *R* and *E* in the diagram. A *behavior unit*, therefore, consists of five anatomical units. In a simple behavior response, a receptor cell is excited by a stimulus, and the excitation is transmitted to a sensory neuron, across a synapse to an internuncial neuron, across another synapse to a motor neuron, and thence to an effector organ.

The synapses.—A synapse is a place where the nerve current is transmitted from one neuron to another. It is supposed to present a greater amount of *resistance* to the passage of a nerve current than that presented by the nerve fibers or cell body. This resistance varies in amount

from time to time, and seems to be affected by drugs, toxic substances, fatigue, use, and general metabolism. The metabolic rate is possibly more rapid at the synapses and in the cell bodies than in the nerve fibers, for there is a richer blood supply in regions containing many synapses and cell bodies.

Nerve energy probably crosses the synapse in definite amounts and at a definite rate or rhythm. There seems to be a summation of nerve energy at the neuron terminals until a certain *quantum* is reached. Then either the whole *quantum* crosses the synapse or none of it. This is the so-called "all-or-none reaction." It implies that the rhythm of response does not necessarily correspond to the rhythm of the stimulus, and that the magnitude of response depends upon the number of neurons involved rather than upon different degrees of activity in the same neurons.

It is possible that neural *inhibition* and *facilitation* are also functions of the synapses. The exact nature of these processes is not known; but there is probably either a blocking of synapses in certain centers or a drainage of neural energy from these centers into synapses of lower resistance. Sherrington has proposed a "theory of blocking" [5] to account for inhibition, while McDougall has advanced a "drainage theory" [6] according to which neural energy is always being drained off from the less active into the more active centers thus inhibiting the former.

It has been found that if the axon of a motor neuron is stimulated at any point along its course, a nerve current is initiated which flows in both directions. It proceeds outward to the effector, causing a response, and it pro-

[5] C. S. Sherrington, *op. cit.*

[6] William McDougall, *Physiological Psychology*, The Temple Primers (J. M. Dent, 1908).

ceeds inward to the cell body and dendrites, but it does not cross the synapse. Similarly, if the peripheral axon of a sensory neuron is stimulated somewhere along its course, the current proceeds outward to the sense organ and inward to the terminal processes of the neuron. In this case, however, the current does not stop there, but crosses the synapse and may find its way ultimately through motor neurons to an organ of response. In other words, a nerve current can flow in either direction in a neuron, but can cross the synapse only in one direction. This is certainly the case in the synapses of the simpler reflexes at the lower neural levels, and it may also be true of synapses at the higher levels in the cortex. The passage of nerve currents across synapses in only one direction is sometimes referred to as the "law of forward conduction." The principle of *forward conduction* is indicated in the diagrams (Figs. 8 and 12) by the direction of the arrows.

Neural pathways and systems of fibers.—The axons of neurons are usually called nerve fibers. There are in the nervous system various systems of these fibers which constitute neural tracts or pathways for nerve currents. There are pathways for nerve currents from the various sense organs to the cortex. There are also pathways from the cortex and other nerve centers down through the brain stem or spinal cord and out to the effectors, and there are other pathways connecting various centers within the central nervous system. These systems of fibers or pathways are sometimes classified into three groups, namely, projection systems, commissural systems, and associations systems.

The systems of *projection* pathways include the afferent fibers which carry nerve currents inward towards the

cortex, and the efferent fibers which carry nerve currents from the cortex towards the periphery. All projection pathways cross in their course from one side of the

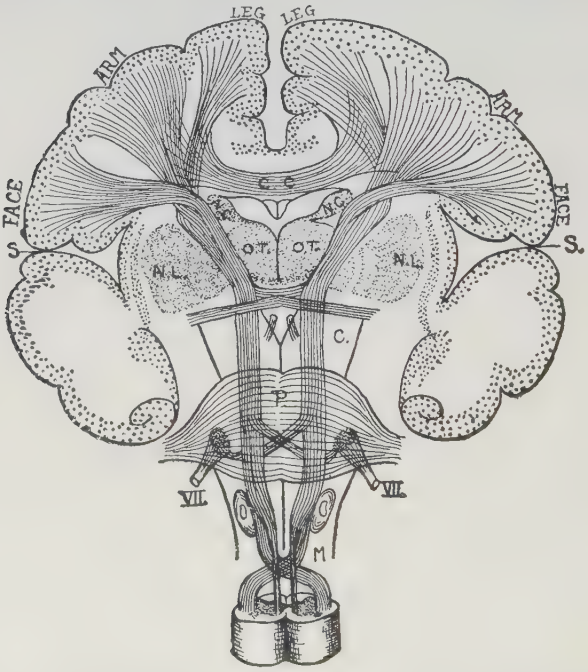

FIG. 9. SCHEMATIC TRANSVERSE SECTION OF THE HUMAN BRAIN THROUGH THE ROLANDIC REGION TO SHOW THE MOTOR FIBERS AND THEIR CROSSING IN THE MEDULLA

S, fissure of Sylvius; *C.C.*, corpus callosum; *N.C.*, nucleus caudatus; *N.L.*, nucleus lenticularis; *O.T.*, optic thalamus; *C.*, erus; *P.*, pons; *M.*, medulla; *VII*, the facial nerves. The fibers passing between *O.T.* and *N.L.* constitute the internal capsule. (From Angell, *Psychology*, Henry Holt, 1908.)

nervous system to the other. The *commissural* fibers are those which connect the right and left sides of the nervous system, for the nervous system is bilaterally symmetrical. The *association* fibers are those which connect different centers on the same side. The term "association" in this

connection is somewhat misleading, for all the various systems of fibers and pathways are, in a broad sense, associative in function. Some of the pathways are indicated in Figures 9, 10 and 11.

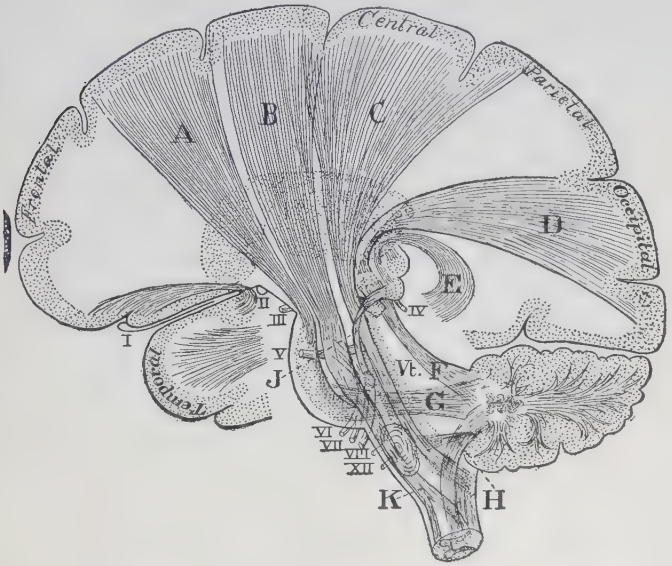

FIG. 10. SCHEMA OF THE PROJECTION FIBERS OF THE CEREBRUM AND THE PEDUNCLES OF THE CEREBELLUM

A, tract from the frontal gyri to the pons nuclei and thence to the cerebellum; *B*, the motor (pyramidal) tract; *C*, the sensory (lemniscus) tract; *D*, the visual tract; *E*, the auditory tract; *F*, the fibers of the superior peduncle of the cerebellum; *G*, fibers of the middle peduncle uniting with *A* in the pons; *H*, fibers of the inferior peduncle of the cerebellum; *J*, fibers between the auditory nucleus and the inferior colliculus; *K*, motor decussation in the bulb; *Vt*, fourth ventricle. The numerals refer to the cranial nerves. (From Howell, *Textbook of Physiology*, Saunders, 1927.)

A pathway may consist of a series of fibers connected by synapses where the nerve current is relayed from one neuron to another. The fibers make up the *white matter* of the cerebrospinal system. The *gray matter* is made up of cell bodies, dendrites, and synapses; and constitutes

the centers that are connected by the fibers. These centers are the points where nerve currents are relayed from one system of fibers to another. For example, afferent currents on their way to the cortex are relayed at various centers, particularly in the medulla and in the mid-brain or thalamus. The chief masses of gray matter are the cerebral cortex, the basal gray of the cerebrum in the

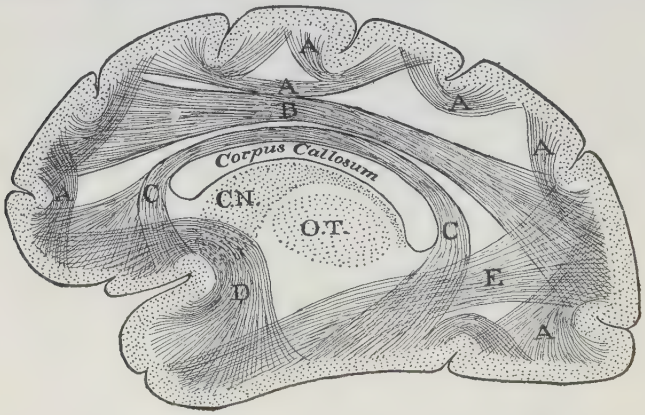

FIG. 11. LATERAL VIEW OF A HUMAN HEMISPHERE, SHOWING BUNDLES OF ASSOCIATION FIBERS

A, A, between adjacent gyri; *B,* between frontal and occipital areas; *C,* between frontal and temporal areas; *D,* between frontal and temporal areas; *E,* between occipital and temporal areas; *C.N.,* caudate nucleus; *O.T.,* optic thalamus. (From Howell, after Starr.)

thalami and corpus striatum, the gray centers in the corpora quadrigemina and geniculate bodies, various gray nuclei in the medulla, pons and cerebellum, and the central gray matter of the cord.

The various parts of the nervous system are more or less intimately connected through these systems of fibers and centers. The cerebellum, for example, is connected by one pathway with the cerebrum, by another with the pons, and by still others with the spinal cord. The whole

nervous system is thus capable of working as a unit. The various possibilities of interconnection cannot be overestimated in their complexity. There must be a vast system of *diverging* pathways whereby each sense organ is connected with all possible effectors, and conversely there

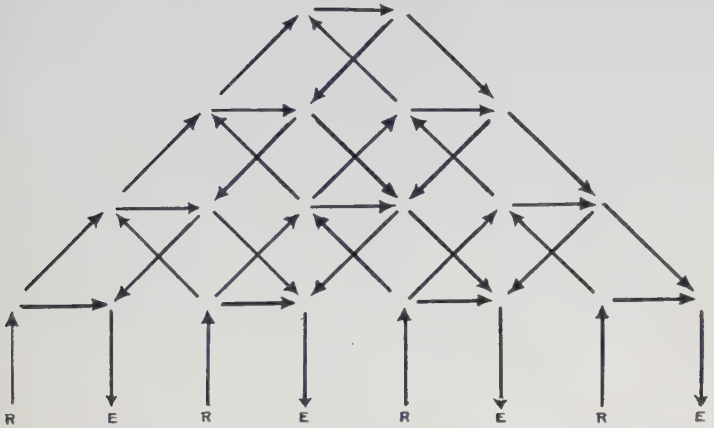

FIG. 12. DIAGRAM REPRESENTING POSSIBLE INTERCONNECTIONS AND RELATIONSHIPS OF NEURONS, REFLEX ARCS, NEUROGRAMS, LEVELS AND PATHWAYS IN THE NERVOUS SYSTEM

R, receptor; *E*, effector. Neurons are represented by arrows, the direction of the nerve current by pointing of arrows, and synapses by spaces between arrows. It will be noted that a nerve current, by following the direction of the arrows, may go from any receptor to any effector, and that increased resistance at certain synapses might result in independent or dissociated activity of the neural systems or patterns thus separated. See page 70 regarding limitations of the diagram. (Adapted from M. F. Meyer, *The Fundamental Laws of Human Behavior*, Badger, 1911.)

must be an equally complex system of *converging* pathways whereby all the receptors are connected with each effector. The result of this is that any effector may respond to the stimulation of any receptor. Such a system is represented diagrammatically in Figure 12. It will be noted that in this diagram one may, by following the direction of the arrows, pass from any receptor to any effector through lower or higher levels.

It is frequently said that these neural pathways are arranged in three *levels,* a lower spinal level, a higher cortical level, and between these a middle level. It is perhaps best to regard these not as three distinct levels, but rather as three rough groups of levels. Within the spinal cord itself, there are scores of levels. There are likewise many levels in the medulla, mid-brain, and basal gray matter of the cerebrum, and there are, no doubt, many levels within the cortex itself. The so-called association areas of the cortex represent higher levels than the simple sensory and motor areas. A nerve current may therefore flow from a receptor to an effector through any one of a number of levels; but, no matter what its central course may be, the sensory and motor neurons of the arc are always the same, so long as the same receptor and effector are involved. This is known as the principle of the "initial common path" and the "final common path."

The diagram in Figure 12 represents some of the possible interconnections and relationships of the neurons, arcs, levels, and pathways in the nervous system. The limitations of any such diagram must, however, be kept in mind. In this diagram there are only four simple reflex arcs, whereas there are a great many such simple arcs in the human nervous system. In the diagram there are only four levels represented, while the actual number of levels is much greater than this, but indefinite. In the diagram the number of levels correspond to the number of simple arcs. There is no such correspondence in an actual nervous system. Moreover, no nervous system has the high degree of integration and unification suggested by the diagram. With these reservations, however, the diagram will be found helpful in picturing some of the

possibilities and indicating the way the nervous system may work.

Neurograms.—The term "neurogram" has been suggested by Morton Prince for any group of neurons that are closely associated and function as a unit. The term "neural pattern" has also been proposed for the same thing. A reflex arc is thus a neural pattern or a neurogram, but there are many other simple and complex neurograms at higher levels in the nervous system. The neurons that constitute a neurogram are associated or connected through synapses of low resistance. This association is much closer and more stable in some neurograms than in others. Such greater stability is due to lower and less variable synaptic resistance. The simpler neurograms are probably more stably organized than the more complex neurograms. It seems likely that within the nervous system there are hierarchies of neurograms, the more complex neurograms including the simpler ones. The hierarchy is thus one of increasing complexity and decreasing stability of neurograms. In other words, the more complex systems of neurograms are more easily dissociated and broken down than the simpler ones.

The resistance gradient.—Stimuli are constantly affecting the various sense organs and initiating nerve currents which are continually impinging upon the central nervous system. Some of these nerve currents find their way through the system to the effectors and produce responses, but they do not always reach the same effectors or the same combination of effectors. This can only be explained by supposing that the nervous system presents a resistance gradient [7] to the stimuli that impinge upon it.

[7] A. P. Weiss, *A Theoretical Basis of Human Behavior* (R. G. Adams, 1925), p. 168.

This means that there are numerous pathways through the nervous system, each presenting a given amount of resistance to the nerve currents. These resistances are graduated in amount from very low to very high resistance. The nerve current follows the path or paths of least resistance. The resistance gradient of the nervous system is, however, continually changing, so that at one time one system of pathways presents the least resistance, at another time, another system. Consequently, the organism seldom responds in the same way to the same stimulus except in the case of the simplest reflexes. The behavior of the organism is not only a result of the stimulus but also of the resistance gradient presented by the nervous system at that particular time.

The integrative function of the nervous system.[8]— Integration means unification, the bringing together of parts into a whole. There are various forms of integration of an organism. An organism is integrated mechanically by its skeletal system, its muscles, and its food canal. It is also integrated chemically, especially through its glandular secretions. The product of an endocrine gland is carried by the blood stream to all parts of the body, and may have effects in distant parts. This is a form of integration. An organism is likewise integrated neurally. The nervous system unifies the organism in its responses and its internal and external adjustments.

The integrative function of the nervous system increases markedly in the course of its evolution from the earthworm to man. The earthworm is mechanically and perhaps chemically integrated, but its neural integration is of a very low order, for each segment can respond

[8] C. S. Sherrington, *op. cit.*

relatively independently of the other segments. As the nervous system evolves, it becomes more and more centralized and interconnected. Hence such piecemeal response becomes less and less common until in man a relatively high degree of integration in adjustment and behavior is attained. The integrative function of the human nervous system may, under certain conditions, break down. In which case the individual is said to be dissociated.

Neural integration is primarily a matter of bonds or connections among neurons. These bonds are of a functional nature depending upon conditions in the synapses. They result in the formation of neural patterns and hierarchies of neurograms (previously described). Some of these neural bonds may be original or innate, while others are acquired as a result of experience. For example, the neural connections involved in reflex action are innate, while those involved in habit are acquired. In other words, there are both original and acquired integrations. The latter may be called *associations*. The term "association" has a double application. It is used with reference to both neurological and conscious processes. Hence, association will be more fully described in Chapter V, "Consciousness and the Unconscious."

Neural integration is found at all levels of the nervous system from the spinal cord to the cerebral cortex. Some integrated neural patterns are mainly sensory, others mainly motor, and still others mainly central. That is to say, connections may be chiefly among sensory neurons, chiefly among motor neurons, or chiefly among internuncial neurons. Other simple or complex connections may, of course, involve all kinds of neurons. Sensory integration is sometimes called *correlation,* while motor

integration is called *coördination.* Some sensory correlations and motor coördinations are due to original nature and some are acquired. Sensations and reflexes are based upon original correlations and coördinations, while perceptions and habits are based upon acquired ones. Acquired sensory correlations and motor coördinations are forms of association. Correlation in the above sense must not be confused with the statistical meaning of the term.

Neural dissociation.—The term "dissociation," like the term "association," can be applied to both the nervous system and consciousness. These processes are therefore discussed in this chapter as well as in the following chapter on "Consciousness." Neural dissociation means the breaking down of the bonds, connections, or integrations in the nervous system, particularly those that have been established as a result of experience. It might be due to destruction of certain connecting neurons, but the most common kind of dissociation is probably due to abnormal variation in synaptic resistance. This is called *functional dissociation.*

The term "dissociation" may also be used with reference to cases where integration has never taken place. In this sense, the nervous system of the earthworm may be called a dissociated system, since the nerve centers in each segment can function relatively independently of the others. Similarly, in the human nervous system certain neural centers or patterns are normally dissociated. The nerve centers which control the processes of circulation, digestion, and respiration function in this relatively independent way. Even in these cases, however, the dissociation is by no means complete, for such processes are somewhat affected by activity in other parts of the nerv-

ous system. They are to some extent under cortical control.

It is perhaps a more common usage to reserve the term "dissociation" for those cases where connections have been broken down in previously integrated systems. Perhaps the simplest example of this type of dissociation is the frequently described *nervous tic*. This is the spasmodic movement of some simple muscle group, such as the winking of an eye or the opening and closing of the mouth. Such a tic is probably due to dissociation from adjoining systems of the nerve center involved in the movement, so that the nerve current can pass readily only directly through the center and out to the muscles concerned. Thus, a center which is normally integrated with the rest of the nervous system functions independently like the segmental ganglia of an earthworm. Nervous tics must be distinguished from purely muscular tics which are due to the direct stimulation of the muscular fibers by the accumulation of toxic products. Muscular tics usually take the form of very simple muscle twitchings.

Somewhat related to the nervous tics are many of those more or less automatic responses which are usually described as *mannerisms*. In this case the nerve centers or neurograms involved are more complicated and the dissociation is less complete. A person may control a mannerism if he is thinking about it or directing his attention towards it. For instance, the little movements and gestures that are made in an ordinary conversation are usually outside of consciousness but may be brought under conscious control. In other words, the neural patterns involved may be brought into relation with the rest of the cortex, although they ordinarily function independently.

The dissociated processes are still more complicated in so-called *automatic writing,* which may be illustrated by the following case: The subject is a woman of average or superior intelligence. If a pencil is placed in her hand, she writes automatically while carrying on a conversation with her physician. When an assistant whispers questions into her ear, she replies to the questions correctly in writing while the conversation with the physician is still going on. When the physician asks her if she knows what she is writing, she replies in the negative, although the written responses are more or less meaningful and coherent.

This phenomenon may be accounted for in the following way: Certain complicated systems of neurograms in the cortex are temporarily dissociated from the remaining systems. The former systems are connected through afferent pathways with certain receptors in the ear, and through efferent pathways with the effectors involved in writing. This whole organized system functions independently of the remaining systems, particularly the system involved in speaking. The "speech" system is also connected through afferent pathways with receptors in the ear, but through efferent pathways with the muscles involved in speech. These two complex systems function under these conditions as independently as the ganglia in two segments of an earthworm.

The difference between this example and the much more elaborate automatic writing of literary productions is merely one of degree. If the dissociated system consists of many complicated neurograms organized through experience, the subject may produce meaningful compositions in automatic writing. This really amounts to so-called *dual personality;* and, as is well known, such

a dual personality may be an alternating personality. First one and then the other personality is manifested. This merely means that the cortical neurograms organized through experience are arranged into two dissociated and relatively independent major groups. First, one group is connected through subcortical pathways with the main sense organs and major effectors, particularly those of locomotion and speech; and then the other system, usually after an interval of sleep, becomes so connected. In "multiple personality" there is a larger number of such dissociated systems.

Localization of function.—The functions of the nervous system are everywhere similar in kind, namely, conduction and integration. However, as a result of the specific connections involved, different parts of the system may be said to have different special functions. It has been pointed out that the cerebellum is concerned mainly with the integrations involved in motor coördination and the maintenance of equilibrium. Similarly, the lower brain centers are concerned mainly with reflex and other processes whose connections are for the most part innate. The cerebral cortex, on the other hand, seems to be concerned mainly with individually acquired sensory correlations, motor coördinations, and other associations. It used to be supposed that there was a definite localization of simple and complex functions within the cortex itself. The present point of view on this subject is summed up by Herrick as follows:

> There is a specific localization of function in the cerebral cortex, in the sense that particular systems of sensory projection fibers terminate in special regions (the sensory projection centers), that from other special regions (the motor projection centers) particular systems of efferent fibers arise for connec-

tion with the lower motor centers related to groups of muscles concerned with the bodily movements, and that between these projection centers there are association centers, each of which has fibrous connections of a more or less definite pattern with all other parts of the cortex.[9]

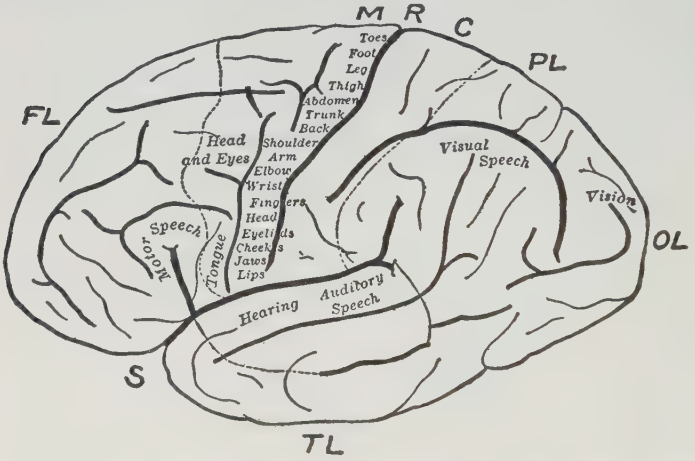

FIG. 13. LOCALIZATION OF SENSORY AND MOTOR FUNCTIONAL AREAS IN THE LEFT CEREBRAL HEMISPHERE

R is above the fissure of Rolando, in front of which, under *M*, are the motor areas of the various parts of the body. *C* is above the sensory area for kinesthetic and skin sensibility, which extends downward behind the fissure of Rolando. The areas for smell and taste are probably located on the mesial surface of the hemisphere. The areas concerned in audition and vision are named. The part marked "motor speech" is Broca's convolution. The parts marked "auditory speech" and "visual speech" are concerned with the perception and understanding of spoken and written words. *S* is opposite the fissure of Sylvius. *FL*, frontal lobe; *PL*, parietal lobe; *OL*, occipital lobe; *TL*, temporal lobe. (After Starr, from Allport, *Social Psychology*, Houghton Mifflin, 1924.)

In other words, only the simplest sensory and motor functions are at all definitely localized. Their localization is indicated in Figure 13. The more complex mental functions or traits, such as attention, memory, thought, and speech, are not now regarded as localized in any exact sense in definite parts of the cortex. These func-

[9] C. J. Herrick, *An Introduction to Neurology* (Saunders, 1927), p. 347.

tions may involve any part of the cortex, or the discharge of nervous energy through extensive regions of the cortex. The specific nature of the function or trait probably depends upon the pattern of nerve pathways involved and the sequence of their activity. For example, the complex function of speech is not now regarded as being localized in Broca's area in the left inferior frontal gyrus. This area is probably concerned in the motor coördinations necessary for articulate language, but speech is a much more complex process than this.

The simple process of hearing and answering a question includes the following functions: the hearing of sounds, the perception of meanings, the mobilization of ideas, the selection of the particular ideas to be used in the response, and finally the response itself. This sequence of functions involves the sensory areas of the brain, vast systems of diverging pathways through the cortex, equally numerous converging pathways, coördination of motor nerve processes perhaps in Broca's area, and the sending out of these properly synchronized and successive nerve currents to the organs of speech. A similar analysis might be made of complicated responses to any sort of situation. The brain, therefore, acts as a unit, and a considerable amount of vicarious functioning is possible; for, if the customary neural pathways are blocked or obliterated, the neural energy may make a detour with the consequent formation of new pathways.

The autonomic nervous system.—The autonomic nervous system is not really a separate system. It is closely connected to the cerebrospinal system and differs from the latter merely in the fact that the efferent nerve current is relayed over an additional synapse in a ganglion quite outside the cerebrospinal axis. There is thus an

extra peripheral neuron which is called the "postganglionic neuron" as distinguished from the "preganglionic neuron" which connects the cerebrospinal axis with the autonomic ganglion. The autonomic nervous system consists of three parts, the cranial autonomic, the sympathetic autonomic, and the sacral autonomic. The cranial and sacral parts together are sometimes called the "parasympathetic system." The different parts of the autonomic system and their connections are shown in Figure 14.

The autonomic nervous system supplies the viscera of the body, the smooth muscles and the glands. Each of these organs has a twofold supply from the autonomic system. It is supplied by fibers from the sympathetic system, and by fibers from the parasympathetic (sacral or cranial) system. This is indicated in the diagram. For the most part, these two systems perform opposite functions: where the sympathetic excites, the cranial or sacral inhibits, and where the sympathetic inhibits, the cranial or sacral excites. This is an example in the autonomic system of reciprocal innervation. Healthy autonomic activity is dependent upon the balance of the reciprocal functions. Some of the functions of the two antagonistic systems are indicated in parallel columns on page 82.

It will be noted that the functions of the sympathetic nervous system are such as occur in exaggerated form in excitement, fear, anger, and in any kind of emergency; while the functions of the cranial and sacral systems predominate in quiet and contentment, as when one is resting after a good meal. The relation of autonomic functions to feeling and emotion is obviously close. A knowledge of the autonomic nervous system and its effectors, the smooth muscles and glands, is therefore necessary for an understanding of the affective life.

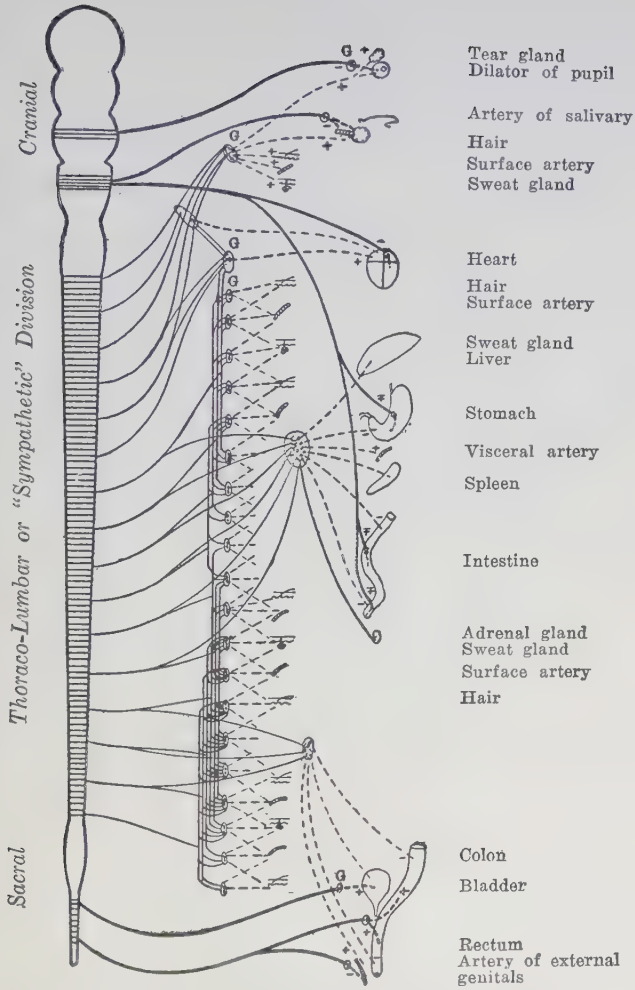

FIG. 14. DIAGRAM OF THE MORE IMPORTANT DISTRIBUTIONS OF THE AUTONOMIC NERVOUS SYSTEM

The brain and spinal cord are represented at the left. The nerves to skeletal muscles are not represented. The preganglionic fibers of the autonomic system are in solid lines, the postganglionic in dash-lines. The nerves of the cranial and sacral divisions are distinguished from those of the thoracico-lumbar or "sympathetic" division by broader lines. A + mark indicates an augmenting effect on the activity of the organ; a — mark, a depressive or inhibitory effect. (From Cannon, *Bodily Changes in Pain, Hunger, Fear, and Rage,* Appleton, 2nd ed., 1929.)

Reciprocal Innervation in the Autonomic Nervous System

Craniosacral or "Parasympathetic"	*Thoracolumbar or "Sympathetic"*
Contracts pupil	Dilates pupil
Inhibits heart	Accelerates heart
Controls rate and rhythm of respiration	Facilitates respiration
Stimulates salivary secretions	Inhibits salivary secretions
Stimulates gastric and intestinal secretions and peristalsis	Inhibits gastric and intestinal secretions and peristalsis
Dilates peripheral arteries	Constricts peripheral arteries
Decreases blood pressure	Increases blood pressure
Contracts rectum and bladder	Relaxes rectum and bladder
Stimulates sexual activity	Inhibits sexual activity
	Stimulates sweat glands
	Erects hairs
	Stimulates liver to release glycogen and a blood coagulating substance
	Stimulates secretion of epinephrin, which intensifies and amplifies sympathetic functions

General types of neural disorder.—The possibilities of disorder in a nervous system such as has been described are threefold. First, neurons may be destroyed by disease, by injury, or by inanition due to inadequate blood supply. Secondly, neurons may be temporarily indisposed or rendered inactive as a result of metabolic changes within the neurons. These changes might be due to auto-intoxication, that is poisoning by substances produced by the body itself; or they might be due to poisoning by substances such as drugs taken into the body. The third possibility

is that abnormal variation may occur in the synapses while the neurons themselves remain intact. This variation may take the form of abnormally increased resistance, or abnormally decreased resistance.

If a nervous disorder is of the first or second type, it is called an *organic disorder,* because in a post-mortem examination gross or microscopic lesions, or changes in the cell bodies may be found. If the disorder is of the third type, no changes in the nervous system can be thus discovered, and it is therefore described as a *functional disorder.* It is important to note that functional disorders from this point of view are also in the last analysis organic, but there is no means at present of determining these organic changes in the synapses. The functional dissociations previously mentioned may be accounted for by this form of nervous disorder.

What is inherited.—Inherited characteristics are those which are dependent upon determiners in the germ cells. They must, therefore, be distinguished from innate characteristics. All innate or inborn traits are not necessarily inherited. The fertilized germ cell grows and develops in an environment supplied by the mother. The nature of this environment has a marked effect upon the developing fetus. The effects of this prenatal environment must not be confused with hereditary influences. On the other hand, a trait may be inherited and yet may not manifest itself at birth. The neural connections upon which it depends require further time to mature. Some responses that occur only after a considerable time has elapsed may nevertheless be inherited. It is important theoretically to distinguish between this maturing of an inherited connection and the formation of new connections as a result of experience.

It is difficult to classify human traits or behavior into the two classes, inherited and acquired. It is reasonably certain that the general *structure* of the body, the anatomical features, are inherited. This includes such parts of the behavior mechanism as sense organs, muscles, glands, and the nervous tissues. It is more questionable whether modes of behavior and mental traits are inherited, for these are dependent upon *integrations* of the structural parts and elements. It seems probable that the capacity to form connections among the elements of the nervous system is inherited. But it is equally probable that the majority of the actual connections and integrations in the human organism are determined by experience.

Certain simple forms of behavior, such as the pupil reflex and the digestive responses, are no doubt due to inherited connections. Other forms of behavior, such as writing or speaking, are as certainly due to acquired connections. But there is much of human behavior which can be classified with less certainty. For example, it is doubtful whether the behavior of showing off, fighting, or making love, is due to original nature or is acquired as the result of experience. It is likely that such complex forms of behavior are dependent upon both inherited and acquired neural connections. However, the evidence regarding their origin is still conflicting; and the scientific student of behavior must therefore adopt a neutral position. Behavior and mental processes should be studied without personal bias, and can be studied without taking sides on a purely speculative question.

CHAPTER V

CONSCIOUSNESS AND THE UNCONSCIOUS

Psychology is the science of consciousness as well as of behavior. The last chapter was concerned with the mechanism of behavior. This chapter will be devoted to a discussion of consciousness in general. One of the first problems that suggests itself is the problem of the ultimate nature of consciousness. Much has been written on this problem without arriving at any generally accepted solution.

It seems probable that consciousness cannot be defined in any exact or final sense. It can only be described and analyzed. In this respect, consciousness is quite analogous to matter. Nobody knows what matter is in any ultimate sense, although it has been analyzed into finer and finer units. The smallest units so far described, electrons and protons, cannot themselves be defined. The ultimate nature of both matter and mind remains a profound mystery. However, these two aspects of experience seem to be closely related, particularly in the nervous system. According to the double-aspect theory, consciousness and neural activity are two aspects of one and the same process. The theory is that when neural processes attain a certain degree of complexity the organism experiences consciousness.

Analysis of consciousness.—Consciousness may be analyzed into major parts, and also into finer units or elements. These parts of consciousness should not be re-

garded as separate divisions, but rather as aspects of a totality. These aspects are separated from the whole merely for analytical and pedagogical purposes. There are three major aspects of consciousness, namely, *cognition, affection,* and *conation.* Cognition is the *knowing* aspect of consciousness. It includes perception, memory, imagination, reasoning, and intellect. Affection is the *feeling* aspect of consciousness. This term is used in psychology in a more inclusive sense than in popular language. It includes feelings, such as pleasantness and unpleasantness, and also emotions, moods, and temperament. Conation is the *striving* or *doing* aspect of consciousness. It includes instinctive and habitual impulses or drives, volition, inhibition or control, and character.

These major aspects of consciousness can be analyzed into more ultimate units or elements. There is some controversy as to the nature and number of these elements. The point of view here taken is that there are three fundamental elements of consciousness. One of these elements is *sensation.* Most psychologists agree that sensation is the chief element of cognitive consciousness. Sensation is the subjective aspect of activity in the sensory mechanism, especially in the sensory areas of the cortex. Some psychologists believe that all consciousness can be reduced to sensations. It is more probable, however, that there are other elements as well. A second element is simple *feeling* such as pleasantness or unpleasantness. This is the chief element in affective consciousness. Its neurological aspect is not definitely known and is considered in Chapter X, "Feeling."

A third element of consciousness is *impulse.* This is probably the main unit of the striving or conative aspect of consciousness. Impulse is sometimes regarded as

analyzable into kinesthetic sensations; but it seems more probable that the simplest impulses are themselves elements of consciousness frequently overlooked because they are so common. Some synonyms for impulse are tendency, drive, trend, and urge. Impulse is probably correlated with neural activity in the motor areas of the cortex. It is the conscious aspect of efferent nerve processes, just as sensation is the conscious aspect of afferent processes. Impulse thus precedes most of our responses, but it does not ordinarily receive our attention. It is easily observed only when the responses are complicated or in some way obstructed. Impulse must of course be distinguished from purpose. The former is a simple and ultimate category in psychology, while the latter is a complex resultant of experience involving ideas and feelings as well as impulses.

Consciousness as a process.—Consciousness is not only a state analyzable into the above elements, but it is also a process or sequence of events. William James described this sequence as "a stream of consciousness." [1] This expression emphasizes the continuity of the process. But James also pointed out that the stream is not a uniformly continuous process. The sequence is sometimes rapid and sometimes slow. It is a succession of "flights and perchings." This stream of consciousness is related to, and identical with, the stream of neural activity. This neural activity may occupy certain centers, or may move rapidly from center to center of the cortex. There are also gaps or intervals in consciousness associated with cortical quiescence, and periods of diminished consciousness correlated with decreased cortical activity. The for-

[1] William James, *Principles of Psychology*, Vol. I, Chap. ix.

mer may be illustrated by dreamless sleep and the latter by states of drowsiness or fatigue.

The unity of consciousness.—It is frequently said that consciousness is a unit, a complete whole. This must not, however, be taken too literally. The unity of consciousness depends upon the unity and integration of the nervous system. It has been shown that the integration of the nervous system is by no means perfect. Some of these neural integrations or connections are due to original nature. They are innate or inherited. But a great many of them are due to experience. They are acquired during the lifetime of the organism. Many of the latter integrations are quite easily broken down. In the same way, consciousness tends to be a unity, but the unification is never complete. The bonds or associations easily weaken and dissolve. Consequently, consciousness is usually somewhat fragmentary, and occasionally major dissociations occur.

In connection with the unity of consciousness, the problem of *personal identity* should also be mentioned. A person is conscious of himself as the same person at successive moments of time. Even after periods of unconsciousness such as after dreamless sleep, he is ordinarily aware that he is the same person as he was previous to the unconscious interval. This consciousness of personal identity is due chiefly to two factors. The first factor is the organic and kinesthetic sensations which are continuous during conscious life, and thus constitute a background that remains relatively permanent in the sequence of conscious events. The second factor in personal identity is memory. This depends on the nature of the nervous system and the organization of neurograms. After a period of quiescence the new neural process follows the old

channels and reactivates the same neurograms. The present correlated consciousness is thus similar to the past.

Association.—Association is an essential characteristic of consciousness as well as a basic function of the nervous system. Association means the formation of bonds or connections. It includes all integrations due to experience. The psychological law of association may be stated as follows: *If two or more experiences occur together they tend to become conjoined so that later if one occurs, the other may also occur.* The neurological law is similar, and may be stated as follows: *When two or more neural systems are active at the same time, the resistance of the synapses between the systems is lowered so that later activity in one system may spread to the other.* The actual bonds in association are thus connections in the nervous system.

In the older psychology the term "association" was applied only to the connections between ideas. As the term is used here, it has a much broader meaning and refers to the formation of bonds between any experiences or processes. In the first place, the bonds may be between ideas, as in the traditional psychology. The ideas will then occur together or follow one another. This may be illustrated by the "association test" in which the experimenter calls out a word and the subject responds with the first word that comes to his mind. Thus the word "table" may be followed by "chair," "boy" by "girl," "cat" by "dog," and so forth. These words or ideas were previously experienced together, and so now the one is followed by the other.

But other bonds may be established by experience. Sensations are connected with other sensations and with

ideas to form perceptions. A perception includes ideas and meanings, as well as the simple sensations aroused by the stimuli. Consequently, what one perceives depends very largely upon the associations formed in his past experience. Affections, such as feelings and emotions, are likewise connected through experience. For example, anger may be associated with unpleasant feeling, as in irritation and annoyance, or with pleasant feeling, as in so-called righteous indignation. Similarly, the emotion of love may be pleasant or unpleasant, depending upon previous successes or failures in love and courtship. Various emotions and feelings are associated in so-called compound emotions and in sentiments.

Impulses, also, and their external manifestations, movements, may become associated with each other. This association results subjectively in the organization of impulses and objectively in the coördination of movements found in various habits, such as playing tennis, writing, or driving a car. Furthermore, impulses may become associated with ideas. Then if the idea occurs, the associated impulse and consequent movement is likely to follow. This type of response has been called "ideo-motor action." It is necessary to emphasize in this connection that ideas have no power in themselves to produce movement. A particular idea results in a particular movement only if connected with that movement through past experience.

Ideas or perceptions may likewise become associated with feelings and emotions. In this way, originally indifferent objects may become pleasant or unpleasant, or may arouse various emotions. Indeed, unpleasant things may actually become pleasant through such association, as when a person learns to like the taste of cod liver oil.

Even pain may come to be a pleasant experience, if it repeatedly occurs in pleasant situations. Similarly, feelings and emotions may become associated with certain kinds of responses. Thus people learn to express their feelings and emotions in socially acceptable ways.

Finally, a stimulus, or rather its effect upon a sense organ, may become associated through experience with a reaction. A simple reaction aroused in this way is called a "conditioned reflex." It is a reflex response to a stimulus which has been substituted through association for the original one. But more complex responses may also be connected in the same way with more complex situations or rather perceptions of situations. For example, fear may become associated with the perception of some harmless object. Such responses are sometimes also called "conditioned responses" by analogy with the conditioned reflex. Conditioning is thus merely a form of association.

Dissociation.—Dissociation has already been described as a neurological process. But it has also a conscious aspect. As a neurological process, it refers to the breaking down of integrations or connections mainly as a result of marked changes in synaptic resistance. Psychologically, likewise, it is a breaking down of conscious bonds and connections. The result is that consciousness becomes fragmentary and incoherent. This incoherence may be manifested in the sequence of ideas, or in the relationship of any mental processes. For example, the feelings may not have their customary relation to the ideas, or the movements of the subject may be irrelevant and quite unpredictable.

Sometimes certain processes are completely separated from personal consciousness. For instance, sensory processes are thus dissociated in hysterical anesthesia, and

ideational experiences are dissociated in forgetting. It is a question whether such dissociated sensory and ideational phenomena exist only as neurological processes, or also as independent conscious processes. This problem likewise arises with reference to the dissociation occurring in various forms of automatic activity such as automatic writing. It will be further discussed in connection with the theories of the unconscious.

Degrees of consciousness.—The normal consciousness has different degrees of clearness. These degrees are sometimes referred to as "levels of consciousness." There is a clear level and an obscure level, and there may be other intervening levels. The degrees of consciousness have also been designated as the "focus" and the "margin" of consciousness. The clear level or focus is the part of consciousness in attention, the obscure level or margin is the part of consciousness outside of attention. These degrees of consciousness can be related to degrees of neural activity in the brain. There is a maximum of neural activity in some areas of the cortex, and lesser amounts of activity in outlying areas. This area of maximum activity is continually changing from one part of the cortex to another. Attention has thus no special cortical localization.

Abnormalities of consciousness.—In a sense, all mental abnormalities are included under "abnormalities of consciousness." The more specific abnormalities will be discussed in the appropriate places. Only certain general abnormalities, which pertain to consciousness as a whole, will be mentioned here. In the first place, there is *dissociated consciousness* which has already been described. A second abnormality is *hyperconsciousness*. This is a general intensification of all conscious processes such as

may occur in fever and in some forms of excitement. A third abnormality is *"clouded consciousness."* This is a hazy, befogged, or twilight state such as occurs in drowsiness, intoxication, fatigue, and certain forms of mental disease. An extreme variation of this kind is complete *unconsciousness*. This may occur as a result of accident, disease, or functional disorder. It also occurs in general anesthesia and in dreamless sleep. In such cases, neural activity either ceases altogether or is only of a very simple nature.

THE SUBCONSCIOUS OR UNCONSCIOUS PROCESSES

There is at present no general agreement among psychologists and psychopathologists regarding the class of phenomena to which the term "subconscious" should be applied, or regarding the interpretation of these phenomena. A similar diversity of opinion is found in respect to the term "unconscious." The distinction between fact and theory in this connection was mentioned in Chapter III. Here it is proposed to refer briefly to some of these unconscious facts, and then to outline the main theories regarding the nature of the unconscious.

Some unconscious events and processes.—Nervous tics, mannerisms, and automatic writing are unconscious processes already described. In these processes there may be different degrees of consciousness. For example, in automatic writing the individual may be conscious of writing but not of what is written, or he may not even be conscious of the writing. Similarly, an individual may be aware of an ordinary mannerism, or he may be quite unconscious of it. In the more complex behavior of everyday life, there are also important unconscious factors such as motives. It is rare that an individual is aware of all

the causes of his behavior. Important motives are frequently quite outside of consciousness. The problem of the motivation of behavior is thus in the main a problem of the unconscious.

It is obvious that memory is based upon unconscious factors. Forgotten ideas are outside of consciousness, and when remembered they are brought once more into consciousness. It is thus a fact that forgotten ideas are unconscious, but it remains a problem how they are conserved. Another illustration of an unconscious process is to be found in the intuitions or "hunches" so frequently reported by some persons. An intuition is itself a conscious phenomenon, but the causes of the intuition are outside of consciousness.

Even perceptions may at times be unconscious. In other words, a situation may cause an impression to be registered in an individual without his being aware of it at the moment. Such an impression may later come into consciousness, and the individual is then unable to account for its origin. In this event it may be regarded as due to telepathy. For example, in one case a person had an intuition that a friend was dead. This turned out to be true. The person concerned thought his intuition was due to telepathic communication. It was, however, found that an obituary notice had appeared in the newspaper in a column adjacent to a news item which this person had been reading. It is more reasonable to assume that he perceived and read the obituary notice unconsciously than that he had received a spirit communication.

Finally, the causes of neurotic symptoms are usually unconscious, and it is one of the tasks of the physician to ascertain these unconscious causes. This he may do through a process of questioning usually called psycho-

analysis. This method of analysis does not, however, imply that the unconscious causes of the nervous symptoms must necessarily be mental. These causes may be in the nervous system in the form of dormant neurograms, or neural configurations. The process of questioning is a method of reactivating these dormant neurograms. This brings us to the problem of the nature of the unconscious.

The neurological theory of the unconscious.—According to the neurological theory, there is no subconscious or unconscious mind. All unconscious processes are neural processes. Memories are conserved as neural traces or neurograms, and, in remembering, these dormant neurograms are reactivated. Similarly, the unconscious motives of behavior, and the unconscious causes of intuitions and neurotic symptoms are of a purely neurological nature. Such factors as neural energy, inhibition, facilitation, and organization are involved. In unconscious perception an impression is made upon the nervous system without any form of consciousness whatever. And in automatic writing and other forms of dissociation, the activity of the dissociated neurograms is not accompanied by consciousness. This theory has also been called "the theory of unconscious cerebration." It has been held by some of the leading neurologists and psychologists such as Carpenter, Ribot, and Münsterberg.[2]

The mental theory of the unconscious.—According to this theory, all the unconscious events and processes referred to above are nevertheless mental. Memories and ideas are conserved as such in an unconscious mind, and the unconscious causes of behavior, neurotic symptoms, and intuitions are likewise mental. There is a considerable

[2] See *Symposium on the Subconscious,* edited by Morton Prince (Badger, 1910).

diversity of opinion among the exponents of this view. Some regard the unconscious mind as a fact, others, as a hypothesis; some regard it as inferior to the conscious mind, others, as superior; some believe it originates in the individual during his lifetime, others believe it is racial in origin.

Some of the advocates of the mental theory of the unconscious have a decidedly mystical attitude. They may believe that consciousness is but a small emerging portion of a large sea of mind below the threshold. This subliminal or subconscious mind constitutes a self which is often considered as superior both intellectually and morally to the conscious self. This is the position of psychical research and of spiritualism. Such mystical views have no place in a scientific treatise.

The most systematic exponents of a mental theory of the unconscious are the *psychoanalysts,* particularly Freud and Jung. Freud divides the mind into three parts: the conscious, the fore-conscious, and the unconscious.[3] The *conscious* is that portion of the mind of which we are immediately aware, the perceptions, thoughts, or feelings of the moment. The *fore-conscious* is outside immediate awareness, but can be very readily brought into consciousness by such means as memory. The *unconscious* consists of those experiences and desires which cannot be brought into consciousness by any ordinary means. Psychoanalysis is one method by which the unconscious may be made conscious, by which forgotten childhood experiences may be brought again to memory.

The unconscious originates out of *mental conflict.* According to Freud, this is primarily a conflict between the

[3] Sigmund Freud, *A General Introduction to Psychoanalysis* (Boni & Liveright, 1920).

perverse sexual wishes of childhood and the conventional morality which the individual is obliged to acquire. As a result of this conflict, the original sexual wishes are *repressed* and a resistance is built up to prevent them from reëntering consciousness. This defense is frequently greatly overdeveloped, so that in consciousness there appears the opposite of the repressed trend. It is the task of psychoanalysis to break down this resistance and reveal the original wishes.

The nature of the unconscious is, according to Freud, *dynamic*. It consists of repressed childhood wishes which are ever striving to express themselves. It is also, as intimated above, *sexual*. The energy that strives for expression is sexual energy. Freud calls it *libido*. The sexuality of the unconscious is, however, a perverse sexuality. It consists of sexual cravings of childhood which cannot be lived out in adult life in a civilized or conventionalized society. Among the most important of these are: autosexual craving or self-love, homosexual craving or love of other persons of the same sex, incestuous craving or love of persons of the opposite sex within the same family, sadistic and masochistic cravings or love of sexual cruelty and pain, and exhibitionistic craving or love of sexual display.

These repressed impulses manifest themselves in various indirect ways, for they cannot be completely annihilated. They express themselves symbolically in dreams, which are thus wishes that cannot be fulfilled in real life. They reveal themselves in mannerisms and slips of the tongue. They are converted or transferred into neurotic symptoms. It is the aim of psychoanalysis to remove the symptoms by laying bare the underlying causes and redirecting the repressed libido into other harmless chan-

nels. This redirection of the libido into higher, that is, socially more desirable, channels, is called *sublimation.*

Carl Jung of Zurich studied psychoanalysis under Freud, but later departed from the master in certain important respects.[4] Freud's conception of the libido or sexual energy is broadened to mean the urge, push, or energy of life which is manifested in other desires and activities as well as the sexual. This libido has two opposing trends: *progression,* the striving forward towards differentiation and the overcoming of intervening obstacles; and *regression,* a pull backwards towards the uniformity and irresponsibility of infantile and prenatal life. The libido may also be *introverted,* that is, turned inwards upon the mental processes, or *extraverted,* that is, turned outwards towards the external world. Jung also believes that the unconscious is racial in origin. There are in the unconscious mind archaic forms of thinking and feeling which hark back to our prehistoric ancestors. These he calls "psychological architypes."

The psychoneurological theory of the unconscious.—According to this theory, unconscious, like conscious, processes are always neurological, but in addition they may also be mental. The chief exponent of this theory is Morton Prince.[5] Prince uses the term "subconscious" in a generic sense to include the unconscious and the coconscious. By the unconscious, Prince means the purely neurological. It includes dormant neurograms and some active neurograms. The *dormant neurograms* are the basis of memory. These have no mental aspect. Simple *active neurograms* also have no mental aspect. They function in

[4] C. G. Jung, *Psychology of the Unconscious,* translated by Beatrice Hinkle (Moffatt, Yard, 1916).

[5] Morton Prince, *The Unconscious* (Macmillan, 1914).

reflexes and in simple automatisms, such as the more common, mannerisms and the less elaborate forms of automatic writing. Up to this point the psychoneurological theory and the neurological theory of the unconscious are identical. The difference arises in connection with the coconscious.

The *coconscious* is a coexisting but dissociated consciousness correlated with the functioning of the more complex dissociated neurograms. It has previously been shown that complex automatic writing may be due to the activity of complex systems of neurograms that have become temporarily dissociated from the systems which make up the rest of the cortex. Prince contends that just as the main systems of neurograms have a conscious aspect, so these dissociated systems may also have a conscious aspect. The active dissociated systems will have a conscious aspect if they are sufficiently complex, because consciousness is merely the subjective aspect of complex neural activity. The conscious aspect of such dissociated active systems is called "the coconscious."

Coconsciousness may therefore occur in many hysterical phenomena.[6] In hysterical anesthesia, the sensations connected with the insensitive areas may be coconscious. In hysterical amnesia some of the forgotten ideas may be coconscious, and may be expressed in automatic writing. In a dissociated personality there may be two or more conscious systems just as there are two or more neural systems. The consciousness that accompanies the major system of neurograms is called "the main consciousness." The major system of neurograms is the system that is integrated with the motor neurons that control speech and

[6] For a description of hysteria and other mental diseases referred to in the text, see Chapter XXVIII.

locomotion. But consciousness may likewise accompany the other dissociated neural systems, which thus become coconscious systems.

It was pointed out in Chapter IV, that the nervous system may be dissociated or disintegrated so that certain systems of neurograms can function relatively independently of the others. This would be equivalent to two or more nervous organizations in one organism. It then becomes a question whether there are two or more consciousnesses, one correlated with each nervous organization. If the dissociated nervous organization is sufficiently complex, it will presumably have a conscious aspect; for the complexity of neural organization is itself the condition of consciousness.

The psychoneurological theory of the unconscious therefore appears reasonable. It is not incompatible with the neurological theory. It merely adds something to it. The unconscious or subconscious is regarded as always neurological, but under certain conditions as likewise mental or coconscious. Furthermore, both psychoneurological and purely neurological theories of the unconscious are compatible with some of the psychoanalytic doctrines. These theories cannot, of course, be reconciled with a purely mental theory of the unconscious. But the psychoanalytic account of the unconscious may for the most part be reinterpreted in terms of neural activity. It is, therefore, possible to accept many of the contributions to psychology made by Freud, Jung, and other psychoanalysts without adopting a purely mental theory of the unconscious.

CHAPTER VI

ATTENTION

Attention is a general characteristic of both consciousness and behavior. It has both subjective and objective aspects. Subjectively, it is the arrangement of consciousness into clear and obscure levels, or into focus and margin. This phenomenon was referred to in the last chapter. Objectively, as a form of behavior, it is an attitude of the bodily organism, an adjustment to a stimulus. It includes such responses as convergence of the eyes and accommodation of the lens for clear vision, sniffing, turning of the head, and in general the directing of the organism towards the stimulus. It is well illustrated by the behavior of a cat crouching, ready to spring on a mouse, and by the attitude of a student poring over his studies.

Neurologically, attention is the facilitation of certain neural processes and the inhibition or partial inhibition of others. The levels of consciousness correspond to the distribution of these two processes in the cortex of the brain. In attention, some area of the cortex is always more active than the others. This area is the neural aspect of clear consciousness, the others, of obscure consciousness. The active area shifts from one part of the brain to another in conformity with the changing content of attentive consciousness. There is thus no specific area of the brain that always functions in attention. In other

words, there is no definite cortical localization of this particular mental process.

Kinds of attention.—Attention may or may not be accompanied by a "feeling of effort." Attention without effort is usually called *primary attention.*[1] Primary attention is determined by the stimulus and by connections already well established in the nervous system. Some of these connections are no doubt inherited, but others are acquired as a result of experience during the earliest years of life. Some of the factors which generally elicit primary attention are: intense stimuli, moving stimuli, and repeated stimuli. These are nearly always effective in arousing attention, and may be illustrated in advertising by the effects of loud sounds, bright lights, and large, moving, or repeated signs.

Primary attention is also aroused by novel objects or situations. In this case, however, the situation must also contain some elements of familiarity. In other words, the situation most effective in securing attention is novel in part, and familiar in part. Attention is also elicited by any object which appeals to the instinctive interests. This probably accounts for the frequent appearance of "bathing beauties," small children, or articles of food in advertisements. Such objects arouse instinctive drives and assure the attention of the reader. Primary attention is thus the primitive form of attention and the kind found in childhood.

Attention characterized by a consciousness of effort is called *secondary attention.* An understanding of this kind of attention requires an analysis of the experience of effort. Careful introspective observation reduces this ex-

[1] E. B. Titchener, *A Text-Book of Psychology* (Macmillan, 1910), pp. 265-302.

perience to conflicting impulses and to kinesthetic sensations, that is, sensations from the muscles, tendons, and joints. These sensations are intensified by conflicting tendencies to respond and consequent innervation of antagonistic muscles. Secondary attention thus arises when there is conflict of impulses and therefore tendencies to respond in two or more ways at the same time.

If these conflicting tendencies are equally balanced no response occurs at all. This may be illustrated by the proverbial ass that starved to death between two bundles of hay. If one tendency is stronger than the other, or is reënforced by other interests, a response will occur but will be accompanied by a consciousness of effort due to the presence of the weaker antagonistic tendency. If a student is studying anatomy and a friend invites him to a dance or a game of cards, he may experience such a conflict of tendencies. The social engagement may seem at first more interesting than his work, but he may nevertheless stick to his task. This will occur if the desire to study is reënforced by other instinctive or habitual interests, such as the desire for achievement, or the wish to please a parent or sweetheart. The consciousness of effort is therefore not the cause of secondary attention, but a result of the conflict.

Secondary attention represents a stage in the learning process. In the beginning of any study there is a conflict of interests and the wish to study must be reënforced by other factors such as ambition or the desire for economic gain. As the study progresses, the student becomes more and more interested in it for its own sake. The conflict gradually disappears and attention without effort replaces secondary attention. This form of attention without effort is called *derived primary attention*. It is similar

to primary attention in the absence of effort, but differs from it in its determination by individual habits or acquired interests. These interests are not universal ones as in primary attention. Derived primary attention is thus the last stage of the learning process. It is the attention of the adult as distinguished from that of the child. It is the attention of the scholar who is interested in his subject. Attention and interest are obviously closely related to each other. In fact, they may be regarded as two aspects of the same process; for facilitation and inhibition are probably the neural bases of both attention and feeling.

The span of attention.—The span of attention means the number of things that may be attended to at once. This varies with different individuals, and with the nature and relationship of the stimuli. It has been shown that in the case of unrelated objects only a limited number can be grasped in one act of attention. This number varies from four to six with different persons. If the objects are related in some way, a very much larger number may be included within the span of attention.

In a psychological experiment on the span of attention, simple objects or letters of the alphabet are exposed for a fraction of a second and the subject reports the number that he is able to see in that time. If unrelated letters are exposed he sees four to six, but if the letters are connected into simple meaningful words he can see as many words as he could letters in the same time of exposure. It is probable that one may attend to a very large and indefinite number of things at once if they are related in such a way as to lead to the same or allied responses. Any object which arouses an antagonistic response will not be attended to, or will inhibit attention to the other

objects. For example, at the theater one can attend to a very great variety of sounds and sights pertaining to the play, but attention may be immediately inhibited by a conversation between persons sitting in adjacent seats. One can either attend to the play or to the conversation, but cannot attend to both at once.

The duration of attention.—Attention is continuous but always changing in both direction and degree. The duration of attention means the period of time during which it may be directed towards the same object. The problem of the duration of attention is somewhat similar to the problem of the span of attention. The duration of attention depends very largely upon the nature of the objects attended to. These objects may be simple stimuli or very complicated situations. In the former case it has been found that attention can last only for a few seconds. The stimulus seems to fade out or lose its meaning if attention persists for any length of time. This will occur if a person concentrates his attention without interruption upon a common monosyllabic word. The word loses its meaning as he gazes upon it. On the other hand, in a complicated situation attention may continue for a long time. In such situations the attention moves fairly rapidly from one aspect of the situation to another. For example, a person may concentrate upon a mathematical problem for a number of hours but in such case he is continually attending to fresh aspects of the problem. The duration of attention is thus dependent in part upon the ability to perceive different aspects of a problem or situation.

The degree of attention.—Attention may be concentrated or dispersed. There is a great difference in degree between the most concentrated attention of the scholar

as he studies an interesting subject, and the dispersed attention which occurs just before falling asleep. Various attempts have been made to measure the degree of attention but without much success. It has been suggested that the degree of attention might be measured by the speed and uniformity of performance in certain tasks. The theory is that any lapse of attention will affect the uniformity of the performance. One of the tasks most frequently used for this purpose is the cancellation of certain letters such as the *a's* or *e's* in a carefully selected and standardized passage of printed material. The degree of attention is measured by the time and correctness of the performance. So many other factors enter into this type of performance that it can scarcely be regarded as a valid measure of degree of attention.

ABNORMALITIES OF ATTENTION

The abnormalities of attention are of three main varieties: first, inadequacy or deficiency of attention; second, extreme concentration of attention; and third, the fixation of attention upon some unusually trivial object or idea. These three forms are called aprosexia, hyperprosexia, and paraprosexia, respectively. They correspond to the three typical forms of mental abnormalities previously described.

Aprosexia.—There are two forms of inadequate or deficient attention, namely, inattention and distractibility. *Inattention* is a state of dispersed attention in which the usual objects or stimuli have partly or completely lost their power to arouse attention. This occurs frequently in everyday life in fatigue, illness, or drowsiness. It is also found in certain types of idiocy. In these types it is extremely difficult to get the patient's attention, not be-

cause he is attending to something else, but because his consciousness is at a low level and he lacks the ability for selective response. Inattention is also found in some forms of dementia præcox,[2] but in this case it seems to be due to an active blocking or inhibition of the attentive process rather than a general reduction of the ability to attend. The subject sometimes seems to begin an attentive reaction, and then suddenly the response is checked by an opposite reaction.

In *distractibility* or mobility of attention, the attention is very easily secured but its duration or persistence is markedly below normal. Such distractibility is fairly characteristic of childhood. A three-year-old child rarely attends to one occupation for more than seven or eight minutes. Distractibility is also found in many feeble-minded persons. There is another type of idiot whose attention is very easily secured but cannot be retained. It is difficult to give such a subject any kind of mental test. He readily begins the task but rarely finishes it. His attention is distracted to something else. Distractibility also occurs in the manic phase of manic-depressive insanity,[2] and in mild alcoholic intoxication.

Hyperprosexia.—This is the concentrated fixation of attention of the scholar upon the useful and systematic development of an idea or plan. It results in a form of absent-mindedness which is supposed to be characteristic of college professors. They are so interested in the problem in hand that many objects and events pass unnoticed. The classical example is that of Archimedes, who was so absorbed in the solution of a mathematical problem that he was unaware of the siege and capture of the city. The

[2] See Chapter XXVIII.

penalty of his concentration was death at the hands of an exasperated soldier.

Paraprosexia.—This is also a continuous and concentrated fixation of attention. In this case, however, it is directed upon a useless or trivial object or idea, and there is no systematic development of the idea. A certain degree of paraprosexia occurs in the persistent ideas of everyday life, as when one cannot rid his mind of some silly rhyme or snatch of melody. A more extreme form of the same abnormality occurs in the fixed ideas and obsessions of the psychasthenic, and in the delusional formations of the paranoiac. We may also classify under this general heading the abnormal increase of the "feeling of effort" which occurs when the conflict of impulses is exaggerated. The attention wavers and action or decision seems impossible. This symptom is quite characteristic of psychasthenia, but it also occurs in moments of weakness or fatigue in daily life. It is analogous to the blocking of attention in dementia præcox referred to above. It is what we experience when we say we are "between the devil and the deep sea."

CHAPTER VII

SENSATION

Sensations are elements of consciousness coördinate with simple impulses and feelings of pleasantness or unpleasantness. These elements are arrived at by introspective analysis and they never occur in adult life apart from other mental processes. A sensation must be distinguished from a stimulus. A *stimulus* is some sort of physical change which affects a receptor or a sensory neuron. This change may be outside the organism, as in the case of sound waves and light vibrations, or within the organism, as in the case of muscular movement or physiological functions. A stimulus causes a physicochemical change in the receptor cell or sensory neuron, which is transmitted along a series of neurons to the brain and ultimately to some effector.

A sensation is the subjective aspect of activity in the sensory mechanism, particularly in the neurons or neurograms in the sensory areas of the cortex. If a nerve current is transmitted to an effector through some lower center it probably has no conscious aspect at all. It is important to distinguish between a sensation as an element of consciousness, and a neural process in the cortex. These are, according to the double-aspect theory, the subjective and objective aspects of the same thing. It is, however, obviously incorrect to say that a sensation travels along a nerve. Only a physicochemical change called a nerve current can do this.

Attributes of sensation.—These are the primary characteristics of sensations, and are four in number. First, sensations possess the attribute of *quality*. There are qualities of sensation corresponding to the different sense organs, and also different qualities within the same sense department, such as the visual qualities, blue and yellow. Secondly, sensations have the attribute of *intensity*. This may be illustrated by the difference between dim and bright light, or between soft and loud sounds. Both the quality and the intensity of sensations correspond to certain aspects of the stimuli. For example, the intensity of sound depends upon the amplitude of vibration, while the quality depends upon the rate of vibration. The intensity and quality of sensation are further considered in the following pages. Thirdly, sensations likewise vary in the attribute of *clearness*. This merely means that they may be in the focus or in the margin of consciousness. That is to say, clearness is a matter of attention. Finally, sensations vary in the attribute of *duration*. They last for a longer or a shorter period of time.

The duration of a sensation may not be exactly the same as the duration of the stimulus. A sensation usually persists for a short time after the stimulus is withdrawn. This is because the activity in the receptor or in the nervous system does not cease immediately when the physical stimulus is removed. This phenomenon is very readily observed in the case of touch sensations. If an object such as a coin is pressed upon the palm of the hand and then removed, the pressure sensation will remain for some time and produce the illusion of the continued presence of the object. A visual sensation also persists after the visual stimulus is removed but for only

a fraction of a second. It is for this reason that a flickering light appears continuous, if it flickers from ten to twenty times per second. This is also the psychophysiological foundation for the perception of moving pictures. The latter are really stationary pictures presented in different positions at the rate of about sixteen per second. The sensation produced by each picture persists until the next one is presented.

Sensory adaptation.—This is a phenomenon that occurs in connection with nearly all forms of sensation. It is the fading out of sensations with their continued duration. For example, a bright room becomes less bright, and a dark room becomes less dark after a few minutes' experience. Similarly, we become readily adapted to odors, or to touch sensations. After we remain in a close room or a chemical shop for a while we no longer notice the odors, and likewise we are ordinarily unaware of the pressure sensations from our clothes. Adaptation may be regarded as a kind of fatigue in the sensory processes.

Sensory adaptation is usually followed by increased sensitivity of the sense organ concerned for other kinds of stimuli. For example, adaptation to a sweet taste is followed by greater sensitivity to salt, sour, or bitter; and adaptation to warmth is followed by greater sensitivity to cold. Similarly, the light seems unusually bright after being in the dark, and the darkness seems greater after being in the light. In the case of vision, adaptation to a color may be followed by a sensation of the opposite or complementary color even when there is no color stimulus present. If one wears red glasses for a while and then removes them, objects without color will appear green, and likewise after the removal of blue glasses everything seems yellow. These after-effects of visual adaptation

are usually called "negative after-images." They should be called "negative after-sensations," for they are sensory rather than imaginal experiences.

Intensity of sensation.—The intensity of sensation is related to the intensity of the stimulus, but there is no exact correspondence. A stimulus may be too weak to produce a sensation. When a stimulus is just barely intense enough to cause a sensation, the latter is called "the liminal sensation." On the other hand, all stimuli produce pain at the greatest intensity. The most intense sensation before pain is called "the terminal sensation." Between the liminal and terminal sensations there are a great many distinguishable differences in intensity. A difference in the intensity of two sensations that is just barely perceptible is called "the just noticeable difference." The liminal intensity and the number of just noticeable differences vary with different sense organs and with different persons. In other words, there are differences in sensory acuity and in sensory discrimination. Tests have been devised to measure this acuity and discrimination in the various sense fields.[1] They may be illustrated by the charts of the optometrist for vision.

The increases in intensity of sensation do not correspond perfectly with increases in the intensity of the stimulus. The relationship between the intensity of sensation and the intensity of the stimulus is summed up by Weber's law. This law may be stated as follows: *In order to secure a just noticeable increase in the intensity of a sensation, it is necessary to increase the stimulus arousing the sensation by a constant fraction of itself.* In other words, equal increments of sensation depend upon rela-

[1] See G. M. Whipple, *Manual of Mental and Physical Tests* (Warwick & York, 1924) Part I, "Simpler Processes."

tive increments of the stimulus. This fractional increase of a stimulus varies according to the senses involved and also from person to person. The fraction for light is about one-hundredth, and for sound about three-tenths. If a room is lighted by a 100 watt light an addition of one watt will cause a noticeable increase in brightness. If it is lighted by a 200 watt light an addition of one watt will make no difference, but an addition of two watts will cause a just noticeable increase in brightness.

Weber's law expresses a relationship between the stimulus and the neural processes. The greater the number of sensory neurons activated, the more the stimulus must be increased in order to activate additional neurons. Weber's law may also be regarded as one form of a general law of relativity in mental life. A similar law is found with reference to the feelings and emotions. The more one has, the more he must get in order to afford an increment of pleasure, and the greater the loss to cause displeasure. Similarly, the small talk and gossip of a Main Street village may be just as disconcerting to the inhabitants as the crimes and sensational divorces of a large metropolis to those who live in the city.

Quality of sensation.—The qualities of *visual sensations* are different in night and day. Each eye is a dual sense organ. It contains two kinds of receptors, rods and cones. The cones function in bright light and the rods in dim light. Consequently the visual sensations in bright light are distinctly different from those in dim light. The latter are less clear and have no color. They differ only in shades of gray. The numerous color experiences of daylight vision may be reduced to six *primary qualities,* four colors and two shades. The primary colors are red, green, yellow, and blue. The primary shades are black and

white. All visual experiences of color and shade are due to combinations of these six fundamental qualities in various proportions.

The four primary colors consist of two pairs called "complementary colors." The two pairs are, red-green and yellow-blue. Complementary colors are those which when mixed in certain proportions on a revolving disk produce gray. They are also the colors which occur in after-sensations and in visual contrast. If one looks at a blue patch on a gray background for a few seconds and then turns his eyes to another point on the background, he will see a patch of yellow. Similarly if he looks at yellow he will afterwards see blue. The same relation obtains between red and green. The after-sensations are the complements of the original colors. The complementary colors also enhance each other when they are seen side by side. This phenomenon is called "color contrast." Mixed colors as well as primaries may have a complementary relationship. For example, purple and greenish-yellow are complementary.

The qualities of color sensations bear a definite relationship to the field of vision. The visual field is the total visible area with the eyes fixed in one position. In the periphery or margin of the field there is total color blindness. Colors are seen only in black, white, or shades of gray. In the intermediate portion of the field of vision there is red-green color blindness. In this part of the field yellow and blue are seen as well as the grays, but there is blindness to the reds and greens. Only in the center of the field is there complete color vision for all six primary qualities and their various combinations. Color vision in the different parts of the visual field may be tested by having the subject fixate a definite point and then bring-

ing colored objects gradually into the field from the periphery.

The *auditory sensations* may be subdivided into two general classes, noises and tones. Variation in the quality of tones is called "pitch." Pitch is sometimes regarded as a combination of two qualities, namely, *vocality,* which changes continually throughout the whole range of pitches, and *tonality,* which repeats itself at every octave. Tones that are not absolutely pure also vary in a quality called "timbre." This is the quality which enables us to distinguish the tones of one musical instrument from those of another, even when they have the same pitch and intensity.

When two or more tones are sounded together they may blend with various degrees of completeness. Sometimes the effect is smooth and pleasant, and sometimes harsh and unpleasant. The former is described as consonance, the latter as dissonance. Some persons are much more sensitive to differences in degree of consonance than others. This sensitivity is probably an important factor in musical ability. Noise may be regarded as an extremely dissonant or discordant combination of tones.

The ability to discriminate between tones of different pitches also varies greatly among different individuals. In the region of middle C some persons can distinguish tones that differ by as little as one-fifth of a vibration per second, while others can scarcely distinguish the difference between two successive tones of the musical scale.

A test has been devised by Seashore [2] to measure pitch

[2] C. E. Seashore, *Psychology of Musical Talent* (Silver Burdett, 1919).

discrimination. This test is one of a series of tests for musical ability. The series includes, also, tests for intensity discrimination, for discrimination of time intervals, for appreciation of consonance, and for musical memory. These tests are on phonograph records and may be given to a large group of persons at once.

There is a very great variety of *olfactory sensations*. Various attempts have been made to classify these sensations and to determine the fundamental or primary olfactory qualities. None of these attempts can be regarded as altogether successful. One of the most recent classifications is that of Henning.[3] He believes that there are six primary olfactory qualities or odors, namely, spicy, flowery, fruity, resinous, putrid, and burnt odors. He suggests that these six primaries bear relations to each other similar to the relationships of the primary visual qualities, and that the manifold varieties of olfactory experience are due to combinations of these fundamental odors in various proportions.

The qualities of *gustatory sensations* proper are only four in number, namely, sweet, salt, sour, and bitter. All the complex varieties of taste experience are due to combinations of these qualities, and to combinations of taste sensations proper with other sensations, such as those of smell, touch, and temperature. Thus taste, as the term is ordinarily used, includes more than the true taste qualities due to stimulation of the gustatory sense organs. The tastes of many articles of food are often more dependent upon odors and other sensations than upon tastes proper. For example, the taste of coffee is a combination of bitter

[3] For a statement and criticism of the Henning theory, see E. A. McC. Gamble, "The Psychology of Taste and Smell," *Psychological Bulletin*, 19 (1922), 297-306.

taste and burnt odor, together with temperature and touch sensations.

The *cutaneous sensations,* or sensations of the skin, may be divided into two classes, namely, *protopathic* and *epicritic* sensations. The protopathic sensations are those of hot, cold, pain, and pressure; while the epicritic sensations are those of warmth, coolness, and light touch. The protopathic are the coarser, and the epicritic the finer sensations. The epicritic functions also include the accurate localization of cutaneous sensation. In the regeneration of a peripheral sensory nerve, the protopathic sensations return before the epicritic. These two systems have not been clearly differentiated neurologically. Many of our cutaneous experiences are blends of simpler sensations. Tickle is probably a light, diffuse touch or muscle sensation; itch is a mild, diffuse form of pain; roughness is interrupted touch sensation; and the experience of wetness is a combination of smoothness and coolness. An illusion of wetness is easily obtained by the proper combination of smooth and cool sensations.

The *kinesthetic sensations* may be differentiated in quality. The muscle sensations may be described as dull, diffuse pressure, or dull pain. The tendon sensations are rather of the nature of strain or effort, while the joint sensations are more like massive pressure. The sensations from the semicircular canals and vestibular sense organs cannot easily be described. They usually occur in the margin of consciousness. Or these sense organs function outside of consciousness altogether. The sensations are perhaps describable as pressure or swimming "feelings" in the head, which at high intensity are experienced as dizziness. This latter experience involves other sensations as well as those from the internal ear.

The *organic sensations* are those which arise from the various visceral organs in the performance of their physiological functions. The sensation of hunger is a dull pain or pang localized in the gastric region, and due to the tonic contractions of the stomach when it is relatively empty. This sensation must be distinguished from appetite, which is discussed in Chapter IX, "Reflexes and Instincts." The thirst sensation is localized in the soft palate or throat, although it may indicate a general need of the whole organism. The sensation of satiation is probably due to pressure of the distended stomach upon the diaphragm. There are other sensations from the digestive system, such as sensations of nausea, sensations of movement of the esophagus in swallowing, and sensations from the stomach and intestines. Among the organic sensations are also included sensations from the respiratory, circulatory, and reproductive systems. These sensations are not easily identified introspectively but they play an important rôle in mental life, particularly in feeling and emotion.

ABNORMALITIES OF SENSATION

The abnormalities of sensation fall into the three general categories already described as subnormal, supernormal, and paranormal. Anesthesia and hypesthesia are both deficiencies in sensation. They are complete loss of sensation, and decrease in the intensity of sensation respectively. Hyperesthesia is increase in the intensity of sensation; and paresthesia is false sensation, that is, sensation without any observable stimulus. Abnormality of sensation may result from sense organ defect, inherited or acquired. If the defect dates from the beginning or from an early age, it may have a marked effect upon

mental development. It sometimes results in intellectual retardation. A child may be retarded in his school subjects as a result of defective sense organs.

Defective sense organs may also result in a "feeling of inferiority" which may have a far-reaching effect upon the development of the whole personality. On the other hand, a defective sense organ may be overcompensated for by the development of an analogous type of imagination. For instance, a person with defective vision may become a visualizer, or a person with defective hearing may develop superior auditory imagination. The innate or early acquired sensory defects and their consequences will not be further described here; but some of the later acquired abnormalities of sensation will be considered in greater detail. The more important of these from the psychological standpoint are the abnormalities which are dependent upon organic or functional nervous disorders rather than upon sense organ defect or deterioration.

Anesthesia and hypesthesia.—The term "anesthesia" means complete loss of sensation, while "hypesthesia" means decrease in the intensity of sensation. The former term is, however, commonly used to cover both of these forms of abnormality. Anesthesia may pertain to any sense department, and an account of one form of anesthesia applies equally well to all the other forms. One of the most common forms is *cutaneous anesthesia.* This may involve all the cutaneous sensations or only some of them, and it may be either organic or functional. An organic anesthesia is due to an actual lesion either in the peripheral sensory nerves, in the sensory pathway, or in the sensory area of the cortex itself. It may involve only a few of the cutaneous sensations at any one time. For example, in syringomyelia there may be a loss in certain

areas of the sensations of pain and temperature and a preservation of the sensation of touch. Similarly, the effect of cocaine is to remove the sensation of pain but not necessarily that of touch or of temperature.

Functional cutaneous anesthesia is of greater interest from the psychological standpoint.[4] This form of anesthesia usually involves all the cutaneous sensations of a given area at once. It occurs without any actual or demonstrable lesion in the nervous system. It is presumably due to a functional dissociation involving the neurograms in the sensory area which receive the nerve current. These neurograms are dissociated by synaptic blocking, and the nerve current may be relayed through simpler arcs or at lower levels.

It is important to distinguish a functional cutaneous anesthesia from an organic one. In the first place, the area of a functional anesthesia does not as a rule conform to the anatomical distribution of the peripheral sensory nerves. For example, the hand may be anesthetic up to the wrist, and the anesthetic area may be separated sharply from the sensitive area. This is sometimes called "an anesthetic glove." Similarly there may be an "anesthetic shoe" or "stocking." These areas do not represent distributions of peripheral sensory nerves. On the other hand, when the patient knows the distribution of these nerves, a functional anesthesia may follow their outline. If the patient is a medical student it may consequently be more difficult to distinguish between functional and organic anesthesia. It seems as if the form of the anesthetic area were determined in part by the knowledge of

[4] For an account of the functional anesthesias, see Pierre Janet, *The Mental State of Hystericals* (Putnam, 1901); and *The Major Symptoms of Hysteria* (Macmillan, 1907), pp. 159-207.

the subject. This will be better understood if we translate knowledge into its neurological counterpart. Knowledge is itself an organization of neural patterns determined by experience. Thus when dissociation occurs it is only reasonable to suppose that the lines of cleavage follow the patterns already laid down in the cortex.

A second distinction between functional and organic cutaneous anesthesia is that the former is often variable. In other words, it may move from place to place, or the area may vary in outline from day to day. For this reason some psychopathologists believe that the anesthesia is merely due to the suggestive influence of the physician's examination. A third distinction is that the reflexes associated with the anesthetic area are preserved in functional anesthesia. This may also occur in organic anesthesia if the lesion is in the higher brain centers.

Fourthly, the patient often appears to be partly conscious of sensations from the anesthetic area, or he seems to possess a peculiar half-knowledge of the stimuli affecting this area. At any rate under certain conditions he is able to react to these stimuli. Janet reports the case of a patient with an anesthetic hand. If he is blindfolded he cannot respond when the hand is touched. However, if he is instructed to say "yes" when the sensitive area is touched, and "no" when the anesthetic area is touched, he responds correctly to each stimulus. Also, if he is asked to guess how many times the anesthetic area is touched, his guess is always correct, although he insists that he does not feel the touches at all.

This peculiar phenomenon may be explained by supposing that the neurograms whose activity results in a consciousness of these touch sensations are dissociated, and that the nerve current is transmitted through simpler

neural patterns to the organs of speech. Another possibility is that the nerve current is transmitted through the customary channels, and that this whole complex system is dissociated from the other cortical systems. In this case Prince would say that the sensations from the anesthetic area are coconscious. In other words, they are conscious, but dissociated from the personal consciousness of the patient.

Somewhat analogous to cutaneous anesthesia is *kinesthetic anesthesia.* This involves the sensations from the muscles, tendons, and joints. We depend in part upon such sensations for our awareness of bodily posture and position. It is obvious, therefore, that kinesthetic anesthesia may have rather serious general effects. If a subject who is afflicted with extensive kinesthetic anesthesia is blindfolded, his limbs may be moved into various unusual and awkward positions and he may be quite unaware of their location. On opening his eyes he will be surprised to see the position of his leg or arm. Kinesthetic anesthesia may be organic or functional. The most common organic form occurs in locomotor ataxia. This disease involves the kinesthetic pathways in the dorsal columns of the spinal cord. Its effect on the patient's locomotion is indirect, and due to interference with the kinesthetic nerve currents which are necessary for the coördination and regulation of the movements in walking.

Pain anesthesia or *analgesia* is of special interest and importance. Pain plays a rôle in the protection of the organism against serious injury and disease. It is also an inhibiting agent and is usually involved in training, especially in the elimination of undesirable habits. A loss or diminution in the sensitivity to pain is therefore a loss of an incentive for self-protection and for the formation of

desirable habits. Pain anesthesia may involve only cutaneous pain or it may also involve the pain sensitivity of the underlying tissues. Cases have been reported of a general lack of all sensitivity to pain. One incorrigible boy was taken by his father to a child guidance clinic where it was found that his general sensitivity to pain was markedly decreased. Ordinary punishment had therefore no disciplinary effect, and his behavior could only be modified by appeal to his special interests. Another child who was continually injuring himself was found to lack normal sensitivity to pain. The neurological basis of such general pain anesthesia is unknown.

There are various forms of *visual anesthesia* and hypesthesia ranging from total blindness to very slight interferences with visual acuity. The visual defects which are due to refractive disorders will not be considered here. These can be corrected by suitable lenses. Color blindness is a form of visual anesthesia involving sensitivity to certain colors. The most common form is partial color blindness in which the subject is not sensitive to reds or greens. In total color blindness there is also a lack of sensitivity to yellows and blues. Everything is seen only in various shades of gray. Color blindness is usually an inherited retinal defect, but temporary color blindness may result from certain drugs and sometimes occurs in hysteria as a functional nervous disorder. The normal retina is totally color blind in the periphery, partially color blind in the intermediate zone, and has complete color vision only in the central area.

A common form of functional visual anesthesia is concentric narrowing of the field of vision. In normal vision the field extends about 90 degrees from the point of fixation. In concentric narrowing it may be reduced to a small

area, as if one were looking through a small opening in dark glasses. A functional visual anesthesia may also involve the whole retina. That is to say, there may be complete functional blindness. This is the type of blindness which is sometimes cured by various forms of suggestive therapeutics.

The peculiar paradox of responding to an unconscious stimulation referred to in cutaneous anesthesia also occurs here. Janet [5] reports the case of two boys who had extremely restricted fields of vision. These boys could nevertheless catch a ball as readily as persons of normal vision. In order to catch a swiftly moving object the reaction must begin when the object is still in the periphery of the visual field. It would be impossible to catch an object accurately if one were looking through a small aperture. In other words, Janet's boys were able to react to stimuli affecting the anesthetic areas of the retinas, just as in the previous case the patient could react to stimuli affecting the anesthetic cutaneous area. The neurological explanation of both cases would be along similar lines. It is well known that a decerebrated pigeon can move about and avoid objects, and it is probable that a person who has functionally dissociated cortical areas may in the same way react correctly to various stimuli.

An interesting form of functional visual anesthesia is blindness to some particular object in the field of vision. This is sometimes called "negative hallucination" since the subject does not see something that is actually there. It occurs frequently in everyday life. We often look for an object such as a pencil or an ink well which is directly before our eyes. In hysteria the patient may be completely

[5] Pierre Janet, *The Major Symptoms of Hysteria*, p. 198.

unaware of a person in the same room and within the field of vision. A similar phenomenon may be induced artificially in hypnosis. This phenomenon is exceedingly difficult to explain in neurological terms. It is necessary to suppose that there is a dissociation from the rest of the cortex of the system of neurograms concerned in sensing a particular object. When the nerve current breaks down the resistance and crosses into this system, the object at once becomes conscious, as when one suddenly sees before him a pencil he has been looking for.

Hemianopsia is blindness on one side of the visual field. It is an anesthesia affecting the nasal half of one retina and the temporal half of the other, and must not be confused with total blindness in one eye. Hemianopsia may be functional but it is usually organic. The organic lesion must be back of the optic chiasm, either in the optic tract or in the primary visual area of one occipital lobe. A lesion in front of the chiasm would result in blindness in one eye. There are other varieties of functional and organic visual anesthesias which need not be described here. Enough has been said to indicate the general characteristics of these disorders and the principles involved in their explanation.

Anesthesias also occur in all the other senses. *Deafness* and partial deafness, due to defective organs of hearing or to organic nervous conditions, are quite common, but deafness may also be a functional disorder. In daily life persons often hear only what they wish to hear, and in hysteria more complete functional deafness frequently occurs. Olfactory and gustatory anesthesias are also common, and are referred to as *anosmia* and *ageusia*. Anesthesias involving the organic sensations are particularly important because they have an effect on emotional

sensitivity. An anesthesia of the hunger sense is one factor in causing anorexia and refusal of food. It is probably due to a relative atony of the stomach walls. Anesthesia of the semicircular canals results in an absence of sensations of dizziness on rotation, and also in a lack of sensitivity to movement. All these anesthesias or hypesthesias may be either organic or functional and are explained along similar lines.

Hyperesthesia.—This is an increased or excessive intensity of sensation. It may be due to increased sensory or nervous irritability, or to abnormal decrease of synaptic resistance in the neurograms concerned. It may affect any of the senses. Marked sensitivity to pain is fairly common. Increased visual sensitivity may be accompanied by photophobia or fear of light. Likewise auditory hyperesthesia may be accompanied by intense feeling reactions to sound. The hyperesthesias are common in nervous conditions, in illness, and sometimes in fatigue. They may be due to organic changes, or merely to functional variations in the nervous system.

Paresthesia.—This is false sensation, or sensation without any observable stimulus. Cutaneous paresthesia may be illustrated by such sensations as "pricking," "tingling," or "crawling," when there is no apparent stimulus. These sensations may accompany digestive disturbances and nervous conditions, and they are of frequent occurrence in mental diseases, particularly in dementia præcox. Visual paresthesias are such experiences as sensations of light or sparks of color with no objective basis; and auditory paresthesias are sensations of buzzing or ringing when there is no external stimulus to cause them.

The paresthesias must be distinguished from hallu-

cinations which will be described in the following chapter. The former are merely false sensations to which no particular meaning is attached. If a person perceives an actual or meaningful object, such as a friend or a definite word, when there is no real object or stimulus present, then the experience is called "hallucination." Paresthesias occur in the other sense departments as well as in those mentioned. False taste and smell sensations are particularly common.

A special form of visual paresthesia is *diplopia,* or seeing double. The normal person can see double under certain conditions. If he fixates an object at a distance, all objects close to the eyes appear double, and conversely if he fixates an object about a foot from the eyes, all objects at a distance appear double in indirect vision. Seeing double may occur in certain mental or physical diseases as a result of paralysis of the external muscles of the eyeballs. The eyes cannot converge for near vision and consequently objects near at hand will appear double. This is probably the cause of seeing double in alcoholic intoxication.

A special form of cutaneous paresthesia is *dyschiria.* This is a disorder in the localization of cutaneous sensation. It may be illustrated in everyday life by those occasions when a person feels an itchy sensation and is unable to find the itchy spot. He can only do so by exploring certain regions of the body, and he may finally locate the itching place with a considerable feeling of relief. In some nervous diseases this symptom is very much exaggerated, so that various cutaneous sensations are indefinitely localized. Sometimes a sensation is localized at a similar point on the opposite side of the body, and sometimes it is localized on both sides of the body at once.

In order to understand dyschiria it is necessary to know how sensations become localized in the first place. An infant in the beginning probably does not experience sensations as definitely localized. He learns their localization by experience, and by various exploratory movements. Localization of sensation is thus strictly speaking a form of perception. The learning of the localization of a sensation is from the neurological standpoint the building up of an associated system of neural connections. In dyschiria these connections are broken down, either as a result of organic lesion or of synaptic blocking. The sensory nerve current is thus drained through lower centers or through other cortical systems of pathways.

A somewhat similar form of abnormality known as *synesthesia* may be described in this connection. In synesthesia a sensation is aroused automatically by a stimulus of some other sense organ. The most common form of synesthesia is so-called "colored hearing." In this case a sound stimulus arouses a sensation of color or light. For some persons each tone in the musical scale arouses a different color. There are numerous forms of synesthesia. A stimulus for any sense organ may arouse a sensation pertaining to another. Various explanations of the phenomenon have been suggested. It must be due to a close connection between certain sensory areas of the brain. In colored hearing there must be a close connection between the auditory area and the visual area. Some authorities believe that this connection is due to original nature, while others believe that it is acquired as a result of experience. According to the latter view synesthesia is due to associations formed in early life. These associations may have been stamped in by an unusual emotional experience connected with the sensations concerned.

CHAPTER VIII

PERCEPTION

Perception has been defined as "awareness of an object present to sense." This is a provisional definition and may be regarded as a satisfactory starting point for the discussion of perception. An object is perceived in space and time and as "present to sense." This last point distinguishes the perception of an object from the awareness of an object in imagination. A perception is a complex mental process. It may be introspectively analyzed into various kinds of *sensations* and *images* which have become associated as a result of experience. For example, the perception of a watch held in the hand consists of the visual sensations of color and shade, the auditory sensation of ticking, and the cutaneous and kinesthetic sensations resulting from handling it. This perception also includes the ideas of the name "watch," of time, of value, of other watches, and so forth. Perceptions are thus determined from within as well as from without. What we perceive depends upon our past experience more than upon external stimuli.

It has been pointed out that a sensation is neurologically the activity of a sensory mechanism, particularly of neurons in a sensory area of the cortex. An idea is neurologically the activity of neurograms other than those in the sensory area stimulated at the moment. Perception, since it consists of sensations and ideas, is correlated with both of these neural processes. It includes the activity of

sensory areas and the divergence of nerve currents into various associated systems of neurograms. Hence the cortical areas for perception cannot be definitely localized.

The more important neural connections in perception are those made in areas adjoining the various sensory areas. The connections are, however, widespread throughout the whole brain, and become continually more elaborated with the development of perception. Perception may also be said to involve neural facilitation and inhibition. In perception, as in all other mental processes, certain neural patterns are always more active than others. In other words, all mental processes involve some degree of attention.

Perceptions are learned.—Sensations are no doubt due to original neural connections. The combination of sensations in perception as well as the addition of ideas involves the formation of other connections as a result of experience. The "big, blooming, buzzing confusion" into which the child is born is a sensory confusion. Order and meaning is brought into this confusion as a result of experience, that is, of acquired neural connections. The child learns to perceive various objects and their relations. For example, if a rattle is placed in an infant's hand he gets cutaneous and visual sensations. When he shakes it he gets kinesthetic and auditory sensations. As a result of experience these sensations become associated and referred to the one source. Certain impulses to action also become associated with the sensations. The child has learned to perceive a meaningful object. In a similar way he learns to perceive his milk bottle, the parts of his own body, the various persons about him, and the numerous objects of the physical world. It is thus not surprising

that different persons perceive things in different ways, each in accordance with his own experience.

In the beginning, the spoken word has no meaning to the infant, but he gradually learns to associate certain sensations and previously formed perceptions and ideas with these words. In this way a meaningless sound becomes a meaningful word. This process is slow at first, but becomes more and more rapid with the ever-increasing store of perceptions and ideas. Similarly the written words are at first meaningless visual sensations, but they gradually acquire meaning as they become associated with other mental processes and reactions as a result of experience. When a person has finally learned to read, the sensory component of the process is at a minimum. The reader does not see all the letters, or even all the words on a printed page. Experimental investigations have shown that only certain "dominant letters" and "cue words" are necessary to arouse the associated ideas and thus enable a person to read.

Perception of space.—In the description of dyschiria it was pointed out that an adult is occasionally unable to localize definitely cutaneous sensations. It seems probable that in infancy all cutaneous sensations are indefinitely localized. The baby gradually learns to identify and localize the different parts of its own body. This is a "trial and error" process consisting of random and exploratory movements which by chance find the stimulated area. The child thus learns to perceive cutaneous space and to identify various points on his own body.

It seems probable that the infant learns to locate the various points in visual space in a similar way. This process involves random and exploratory movements of the eyes. The first visual experiences in infancy have probably

only quality and intensity and are not definitely localized in the visual field. When the eye can follow an object such as a lighted match, the visual sensations become combined with kinesthetic sensations and impulses, and the child then begins to perceive a two-dimensional space. The localization of points in this two-dimensional space becomes more and more accurate with experience, just as in the case of localization of parts of the body.

The *perception of distance* or of the third dimension is still more obviously a result of experience. It is some time before the baby learns that certain objects are beyond his reach. He may even try to grasp the moon. The perception of distance is based upon two groups of factors sometimes referred to as primary and secondary factors. The "primary factors" are convergence of the eyes and accommodation of the lens. In binocular vision the eyes converge upon the object fixated. This convergence is greater, the nearer the object. It therefore forms a basis for the perception of distance as far as 20 or 30 meters from the eyes. The accommodation of the lens means the increase of the curvature and refractive power of the lens for near vision and its decrease for distant vision. This affords a monocular physiological basis for the perception of distance. However, accommodation can assist in distance perception only within a small range, from about 10 centimeters to about 8 meters from the eyes.

The "secondary factors" in the perception of the third dimension are such as may be used by an artist in the creation of an illusion of distance in a painting. They include such factors as the course of contour lines, the clearness of outline, the distribution of light and shade, the superposition of one object over another, and the size of familiar objects. An object near at hand seems larger than

the same thing at a distance. Consequently the size of a well-known object is a very good cue to its distance. Another secondary factor in the perception of distance is the apparent relative motion of different parts of the landscape when the head is moved. If a person fixates some particular object and then moves his head, everything nearer at hand than the object fixated appears to move in the opposite direction, while everything farther away appears to move in the same direction as the eyes. By means of these primary and secondary factors perception of distance gradually becomes more and more accurate, as a person has more and more experience and practice in judging distance.

There is also an *auditory space perception.* Sounds appear to come from different points in space. The perception of the direction of sound seems to be based chiefly upon the difference in the intensity of the sound in the two ears. It may also be based in part upon difference in phase of the physical sound wave as it reaches the two ears. Investigations have shown that blindfolded subjects can always tell whether a sound comes from the right or left, but are unable to locate sounds definitely in a median plane. Sounds that are directly behind, in front, or above cannot be accurately localized. This might be expected, for sound waves coming from anywhere in this plane will reach the two ears with the same phase and intensity. This fact has some medicolegal significance. For example, a witness may be correct if he reports that the sound of a pistol shot came from the right or the left. He cannot, however, without the assistance of vision be certain whether it came from directly in front or directly behind him.

Perception of time.—It is necessary to distinguish between the perception of time and the memory of past

events. Perceived time is the consciousness of time as it passes. The perception of time is also dependent upon experience. It is based upon the succession of events. For the perception of time the succession of external events is probably not so important as the sequence of physiological rhythms, tensions and relaxations, within the organism itself. When there are few external events a person is likely to be more conscious of these physiological processes and consequently more conscious of time. In other words, relatively empty time seems long in passing. The same period, however, seems short in memory, because

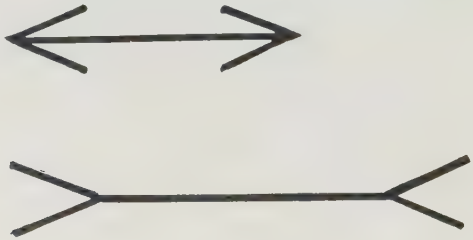

FIG. 15. MÜLLER-LYER ILLUSION. WHICH LINE IS THE LONGER?

the memory of time depends upon the occurrence and succession of external events. It follows that accuracy in the perception of time varies greatly under different conditions. There are likewise differences among individuals in the ability to estimate the duration of time.

The *perception of rhythm* is closely related to the perception of time and is dependent mainly upon accentuated movements within the organism. The rhythmic variations in these movements may be in response to actual variations in the objective stimuli, or they may be dependent upon internal factors alone. In the former case the

stimulus itself is accentuated as in the beating of a drum. In the latter case there is no rhythm in the stimulus at all, but the subject nevertheless perceives a rhythm because of his incipient or actual rhythmic responses. For example, one generally perceives a rhythm in the ticking of a watch, or in the beating of a metronome. This is no doubt due

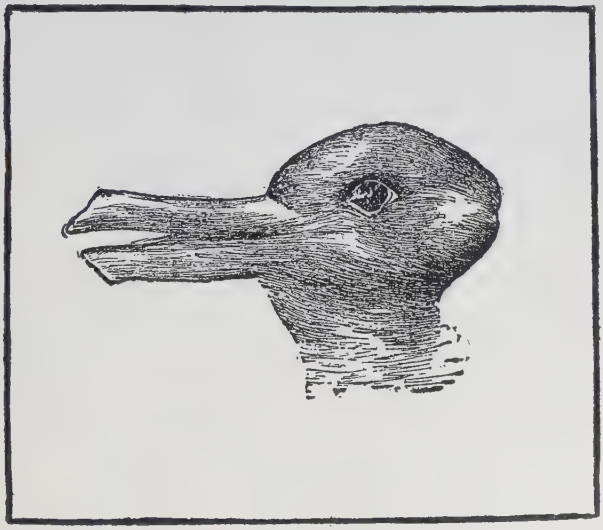

FIG. 16. WHAT IS IT?

(From Jastrow, *Fact and Fable in Psychology,* Houghton Mifflin, 1900.)

to a tendency to respond with different degrees of intensity to uniform stimuli.

The *perception of motion* is likewise based to some extent upon the perception of time. It is necessary at first to distinguish between perceived motion and inferred motion. A person may actually see a thing moving, or only judge that it has moved because its position has changed. Actually perceived motion depends in part upon the fact that stimulation of a sense organ persists after the stimu-

lus is withdrawn. If an object is moved quickly across the visual field, it is followed by a rapidly fading-out visual after-sensation. Similarly, a moving cutaneous stimulus is followed by a quite persistent after-sensation of touch. The perceived rate and direction of movement is dependent upon such after-sensations.

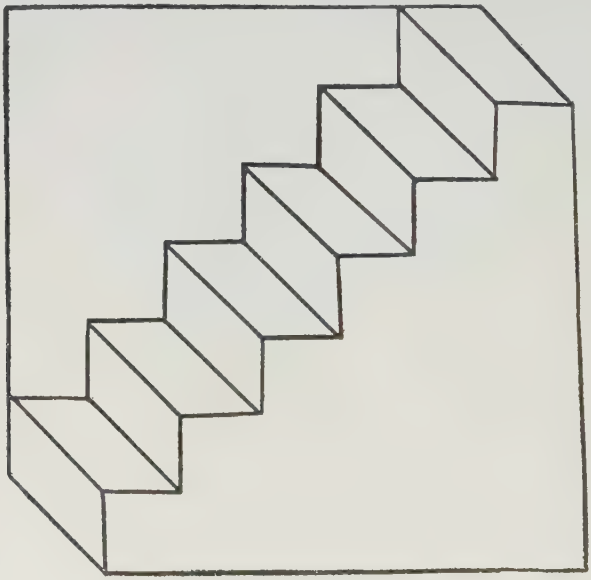

FIG. 17. THE REVERSIBLE STAIRCASE

Normal illusions.—An illusion is an inaccurate or inexact perception of an object or situation. Many illusions are normal in the sense that all persons experience them. The so-called "geometric optic illusions" are normal illusions. These optic illusions are quite numerous and varied. They are illustrated in Figure 15 by one of the most common forms, which is called the Müller-Lyer illusion. The two lines are exactly the same length as may be

demonstrated by measuring them, but they appear of different lengths to normal persons. The double vision of a single object, when it is seen in indirect vision nearer or farther away from the eyes than the point fixated, is also a normal illusion. Normal illusions likewise occur in connection with the other sense organs. If two fingers are crossed and a small round object placed between them, it is perceived as two objects. This is called the "Aristotelian illusion" because it was first described by Aristotle. After-sensations may also be regarded as normal illusions. All these illusions are dependent upon the nature of the sense organs themselves, and it would be abnormal not to experience them.

Normal illusions may also arise from the fact that two or more systems of ideas and reaction tendencies may become connected by experience with the same sense data. In these cases an object is perceived now in one way and now in another. This is illustrated by Figures 16 and 17. These objects may each be perceived in two ways. Here the two different perceptions are clearly dependent upon factors within the individual, because obviously no change takes place in the actual stimuli.

ABNORMALITIES OF PERCEPTION

The abnormalities of perception must be distinguished from the abnormalities of sensation described in the last chapter. The latter will of course result in abnormal perception since sensation is an integral part of perception. But the abnormalities of perception, proper, are those which are referable to the associated ideas and other mental processes in perception. Neurologically, they are due to abnormalities in the nerve connections that have been acquired as a result of experience. The abnormalities

of perception fit readily into the usual categories. They are imperception or insufficiency of perception, superperception or unusual complexity of perception, and false perception.

Imperception.—Imperception or agnosia may exist in various degrees. It may be a marked inadequacy of perception, or a complete lack of perception. The sense data fail to arouse the associated images and reaction tendencies, and therefore have no meaning. Imperception is due in general to the breaking down of acquired neural connections. Thus an adult reverts in whole or in part to the original imperception of infancy. But the term may also be applied in certain cases where the subject is unable to acquire ordinary perceptual experience. Imperception may be general, involving to some extent all the sense departments. This occurs in "clouding of consciousness," such as occurs in fever delirium or in drowsiness. In these cases there is a poor apprehension of objects in general. The most interesting forms of imperception are, however, specific, affecting only one sense department. The most common forms of specific imperception are mental blindness, mental deafness, and astereognosis.

In *mental blindness* or visual imperception the visual stimuli have lost their meaning. The patient can see an object shown him, but he cannot name it or indicate its uses in any way. He senses the object but does not perceive it, just as the infant originally senses objects before he has learned to perceive them. Sometimes mental blindness pertains only to the perception of written symbols. This form results in inability to read, and is therefore called "alexia" or "word blindness." In this case the patient sees a printed page merely as a distribution of black and white marks without meaning. In other words,

he sees the page as the infant first sees it, or as an adult would see a page printed in a foreign and unknown language such as Russian or Chinese. The subject has lost an ability he once acquired, the ability to attach meanings to printed symbols.

This mental blindness must of course be distinguished from the inability to read of an illiterate person who has never tried to learn the meanings of printed symbols. Moreover, occasionally an otherwise intelligent person seems to lack the capacity to learn to read. Such a person is also said to be word-blind. This inability to form neural connections must, however, be distinguished from the breaking down of connections after they are once made.

The ordinary form of mental blindness is probably due to an organic lesion or a functional dissociation involving the neural systems surrounding the visual sensory areas. The function of these systems is the connection of the visual areas with other neural patterns. When these connections are broken down, the nerve current cannot flow into these neural patterns. Consequently, the associated ideas and reactions cannot be aroused. Mental blindness is perhaps more frequently due to organic lesions involving these areas, but it may also occur in hysteria as a result of functional dissociation of the same neural systems.

In *mental deafness* or auditory imperception sounds are sensed but have lost their meanings. For instance, if the patient is blindfolded and a bunch of keys is shaken, or a bell rung, he can hear the sounds but cannot identify them. Mental deafness usually involves the perception of spoken words, and in such a case it is sometimes called "word deafness." The words are heard merely as sounds, just as they were heard originally in infancy. These sounds have

no meaning. A person's native language sounds like speech in a foreign tongue. Word deafness is thus also the loss of an ability acquired by experience, the ability to understand spoken language.

Mental deafness is probably due to an organic lesion or functional dissociation involving the neural systems surrounding the auditory sensory area in the left hemisphere. The function of these systems is to elaborate the afferent nerve currents and connect them with neural patterns in other parts of the brain. If these connecting pathways are blocked or broken down, the associated neurograms cannot be activated; and on the conscious side this means that associated ideas and impulses cannot be aroused.

A third form of imperception is *astereognosis,* or tactile-kinesthetic imperception. It is loss of the ability to recognize and identify objects by handling them. The subject can feel the cutaneous and kinesthetic sensations, but he cannot give them meaning. For example, if a half dollar is placed in the patient's hand without his seeing it, he cannot tell what it is, although he has no cutaneous or kinesthetic anesthesia. The explanation of this form of imperception is similar to that of the others. There is an organic lesion or functional dissociation involving the neural systems surrounding the sensory areas concerned. The connections with other neural patterns are thus broken down, and there is a corresponding loss in consciousness of the ideas and impulses usually associated with the sensations. There are other forms of imperception connected with other sense departments, such as taste and smell. In all these cases the stimuli are sensed but not perceived, that is, not recognized or given meaning; and the explanation in all cases is along similar lines.

Superperception.—This term may be applied to the high development of perception achieved by a scholar in his own particular field. Objects are more clearly perceived in all their details, and are given more meaning by one who has spent a lifetime in the study of them. For example, the geologist sees many things in a walk through the country that would pass unnoticed by the ordinary person. The facts perceived by a botanist on a similar stroll would be quite different from those perceived by the geologist. The actual sense data might be precisely the same, as when the two men are walking together, but entirely different things are perceived. Each person has superperception in his own field. Similarly a sailor or a woodsman learns to perceive those aspects of the environment which are most significant to his success and welfare.

A person with defective sense organs may develop superperception in other sense fields. The case of Helen Keller, who is both blind and deaf, was mentioned in Chapter IV. Her other sense organs are really no keener than those of the average person; but she has developed through experience an unusual power of perception in relation to those other senses, particularly touch and smell. Such a development follows the direction of interest and attention. Neurologically, it means the building up and elaboration of neural connections in the brain about the special sensory areas involved.

Illusion.—The normal illusions have already been described, but there are illusions which may be regarded as abnormal because more unusual. These, too, may occur in everyday life. In the dim light a cloak hanging on a peg may be perceived as a man in the room. On a dark road at night a tree may be perceived as a ghost or a highwayman. Such illusions are in part dependent upon ex-

ternal conditions, but to a greater extent upon personal factors. They usually occur in fatigued or emotional states. In mental diseases they are especially common. Voices are heard in the creaking of doors or in footsteps; and similar illusions occur in the other sense fields.

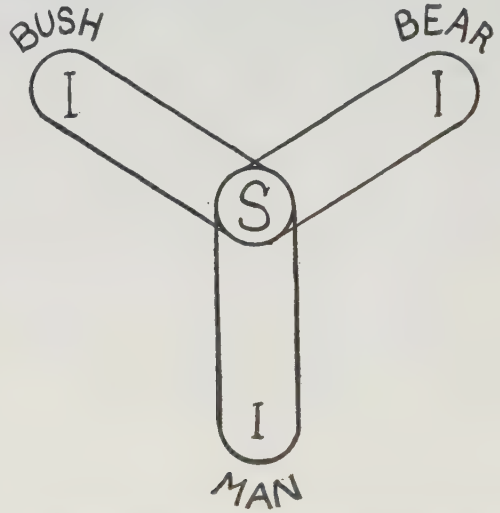

FIG. 18. DIAGRAM REPRESENTING THREE DIFFERENT PERCEPTIONS OF THE SAME EXTERNAL OBJECT

The sensations, *S*, are the same in the three perceptions; but the associated ideas and images, *I*, are different. Neurologically, *S* represents sensory neurons, while the three *I's* represent different associated neural systems.

These illusions are due to the arousal of inappropriate associated ideas. The same sense datum may be connected with different systems of associated ideas. For instance, on a lonely road at night the sense datum may be merely a distribution of light and shade. This may arouse at one time associated ideas resulting in the perception of a bush, at another time ideas for the perception of a highwayman, and at still another time ideas for the perception of a

bear. This may be illustrated by the diagram, Figure 18, in which *S* represents the sense datum and the other parts of the figure represent the three different systems of ideas. Only one of these perceptions is appropriate on one occasion. If another is aroused on that occasion it is an illusion. The inappropriate associated ideas may be aroused as a result of suggestion, expectation and feeling, or habits of thought. A person is more likely to see a highwayman where he should see a bush, if he has recently been discussing the subject of hold-ups and feels a bit nervous. He is more likely to see a bear if he believes there are bears in the vicinity and is afraid of them.

> Such tricks hath strong imagination,
> That, if it would but apprehend some joy,
> It comprehends some bringer of that joy;
> Or in the night imagining some fear,
> How easy is a bush supposed a bear!
>
> (*A Midsummer Night's Dream,* Act V, Scene I.)

The neurological explanation of illusion may be as follows: the nerve current initiated by the stimulus flows from the sensory area into wrong elaborative or associated channels, that is, into paths which, because of the present nervous set, offer the least resistance, but which do not lead to a correct response to the situation. There is probably a relative dissociation of the proper or habitual paths by their relatively greater synaptic resistance, or a facilitated association of the unusual neural system because of decreased synaptic resistance. This may also be illustrated by the diagram in Figure 18. The circle *S* may be taken to represent a group of sensory neurons, while the three ovals represent different associated neural systems. The perception depends upon the neural system

which happens to be activated by the sensory processes on any particular occasion.

Hallucination.—An illusion is an inaccurate perception of an actual object, while a hallucination is a perception without any external object. This is the distinction which is commonly made, but it is only an arbitrary distinction which can be broken down by critical examination. A hallucination may be only a more extreme form of illusion in which the actual stimulus is not so easily identified. Hallucinations are, however, more likely to be of pathological significance than illusions. They occur quite frequently in mental diseases, particularly in dementia præcox. They may, however, be experienced on occasion by persons who are not mentally diseased. They sometimes occur in fatigue and in physical illness. They likewise occur in the hypnagogic state, that is, the drowsy state between waking and sleeping. They may also be produced artificially in hypnosis. Moreover, any person who dreams has hallucinations, for in dreams perceptions are experienced without the presence of actual objects.

Hallucinations may pertain to a single sense, or may involve several senses at once. These combined hallucinations occur in dreams and also in states of clouded consciousness, such as delirium. Hallucinations involving only one sense are, however, more common. They may involve any one of the sense departments. *Auditory hallucinations* usually take the form of "voices." These voices must be distinguished from the so-called "voice of conscience" which is an inaudible voice, a mere feelingful thought. The hallucinatory voices are experienced as audible words just as if some person were actually speaking. Sometimes these words are "neologisms," that is, meaningless

or nonsense words which the patient may find difficult to interpret.

In some cases two or more voices may be heard in conversation or argument. One voice may be heard accusing the patient of various misdemeanors and another voice defending him. These are called "attack and defense" voices. They probably represent an internal mental conflict of the patient. It is, of course, obvious that all hallucinations are outward projections of something within the mind of the patient, since there is no adequate external basis for them. Patients frequently complain that the voices are using foul and unspeakable language, but even in these cases the language must be the exteriorization of the patient's own thoughts. In one form of auditory hallucination called "double thought" the patient hears his own thoughts spoken aloud as if by another voice. In this case he is aware that the voice is repeating his own thoughts, but he may explain this phenomenon by fantastic delusions such as that some one is stealing his thoughts. He has, of course, no understanding of the mechanism of external projection of ideas.

There is a very great variety of *visual hallucinations*. The patient may see an absent friend, an animal, a devil, snakes, insects, and so forth. These visual hallucinations may be stationary or moving, permanent or transient, and large or small in size. For instance, in delirium tremens the hallucinations are likely to be small moving objects such as insects or small animals; while in dementia præcox they are more likely to be normal in size, stationary, and relatively unchangeable from day to day.

Hallucinations of movement are particularly interesting. These may pertain to the kinesthetic senses or to the semicircular canals. The patient feels as if he were moving

when no movement is actually taking place. He may feel as if he were flying, translated through space or raised from his bed. A similar experience sometimes occurs in dreams. It is called a "hallucination of levitation." Hallucinations of movement may also involve special groups of muscles such as those concerned in speech or in writing. The patient then feels as if he were speaking or writing when no such responses are taking place.

Sometimes the hallucinations of movement are projected outwards, and may involve the visual sense as well as the senses specially concerned in movement. The patient then perceives the objects about him as moving. One patient felt as if the floor were rolling like waves on the sea, and he had difficulty in maintaining his equilibrium in locomotion. In alcoholic intoxication it is a common experience to perceive objects moving about. An intoxicated person on returning from his carousal may perceive the objects in his room moving, and may feel that he must catch a chair or the bed as it passes him. Such experiences are probably due to some disturbance of the semicircular canals or their neural connections.

Hallucinations occur also in the other sense fields, but they are difficult to distinguish from illusions and from paresthesias. Hallucinations of pain are especially common, and are often described as "stabs," "prods," or "electric shocks." Hallucinations or illusions of taste and smell are sometimes responsible for the refusal of food which does not seem to have the proper taste. Sometimes a patient seems to smell gases or perfumes when there are no such odors present. There may also be hallucinations or illusions involving the cutaneous and the various organic senses, and these may form a basis for the development of strange delusions. For example, one patient had

the delusion that her stomach was full of bees. Post-mortem examination revealed a pathological condition of the stomach which apparently had been interpreted by the patient in this strange way.

Hallucinations have an intimate relation to all the other mental processes, just as normal perception is so related. It is well to remember that the hallucinatory experience is just as real to the person concerned as an actual perception. It is true that in some cases the hallucinated person may have sufficient insight to realize that the perception is a false one. This is particularly true when the hallucinations occur sporadically in everyday life. Usually, however, the hallucination is mistaken for a true perception, and its reality may be maintained against the testimony of the other senses or of other persons by various fantastic explanations. In these cases there is clearly an intimate connection between the hallucinations and the delusions and fantastic explanations which follow them. They may both be based on some more fundamental instinctive drive or biological need.

Hallucinations are closely related to the feelings and emotions. Sometimes they are agreeable, sometimes disagreeable, and occasionally apparently indifferent. Pleasant and unpleasant hallucinations may alternate in the same person. Fear or anger responses may also occur with reference to hallucinations. In delirium tremens the subject seems obviously afraid. A hallucination usually compels the attention of the patient, and it may exert a powerful influence on his conduct. For example, a "voice" may be immediately obeyed, and crimes may thus be committed on its command.

Numerous theories have been advanced in explanation of hallucinations. Only a few of the more plausible views

will be mentioned here. Binet first broke down the distinction between illusion and hallucination by his *"point de repère"* theory.[1] According to this view, there is always an external object however small to serve as a starting point for hallucination as well as for illusion. Binet studied the hallucinations of hypnotized subjects. In one experiment he showed his subject a number of blank cards, telling him that each one was the photograph of some historic person. These cards were numbered on the back for identification. Binet found that he could afterwards shuffle these cards about and present them in any order, but that the subject always recognized the same card as the photograph of the same person. For instance, one card was always recognized as Napoleon. If it was turned upside down it was still recognized as Napoleon, but the subject would say it was upside down. Binet concluded that there must be some small spot or mark on the paper which acted as a "landmark" or stimulus to arouse the associated images constituting the perception, and which enabled the subject to react differently to each card. Such a mark is the *"point de repère"* which initiates the afferent process in hallucination.

Other authorities have pointed out that the afferent process may also originate in the sense organ itself. Some change, pathological or otherwise, in the eye or ear may be a sufficient sensory basis for a visual or an auditory hallucination. The afferent process may even originate in the sensory pathway or in the sensory area of the cerebral cortex. It is only necessary to suppose that the sensory area of the cortex is stimulated in some way. The nerve current thus aroused spreads thence into some pre-

[1] Alfred Binet and Charles Féré, *Animal Magnetism* (Appleton, 1888), pp. 211-276.

viously prepared elaborative channels. Illusions and hallucinations thus differ only in degree. They both involve some sensory process. This sensory process may be initiated by an actual object, by a *"point de repère"* in Binet's sense, or by some change in the sense organ, sensory pathway, or sensory cortex of the brain. The afferent or sensory process, no matter how initiated, can, however, explain only the sensory character of the hallucination. It cannot account for its particular content.

The content of the illusion or hallucination may be accounted for neurologically by reference to the associated neural patterns through which the nerve current diverges. The current flows through inappropriate or unusual channels as a result of some unusual variation in the resistance of the pathways. The customary pathways are dissociated, or there is a decrease in the resistance of the other pathways. All the facts go to show that hallucinations always occur in a relatively "dissociated state." [2] This is true whether the hallucination occurs in mentally diseased or mentally healthy persons. In the case of mentally healthy persons, hallucinations only occur during fatigue, emotional stress, or drowsiness, that is to say, in dissociated states.

According to the psychoanalytic view, hallucinations are symbolical representations of repressed wishes, that is, wishes dissociated from the personal consciousness as a result of mental conflict. This is a purely psychological account and as such may be correct. In other words, a dissociated consciousness may exist, and the hallucination may be the fulfillment of a wish or a biological urge. For example, one patient had a hallucination of the infant

[2] Edward Parish, *Hallucinations and Illusions* (Scribner, 1897).

Jesus involving various senses. She not only saw and heard him but carried him in her arms and attended to his various needs. This hallucination may be understood in relation to certain fundamental but unsatisfied instinctive drives and biological needs. The sex drive, the parental drive, and even the ego drive are involved and satisfied in the hallucination. Such a psychological account does not, however, relieve us from the necessity of giving an explanation in neurological terms also. This we have attempted to do in terms of a sensory process diverging through neural channels inappropriate in that particular situation.

CHAPTER IX

REFLEXES AND INSTINCTS

A distinction is often made between man's original nature and his acquisitions, between characteristics due to inheritance and those due to environmental influences. It is difficult to separate these two aspects of human nature, and no attempt will be made to do so in this book. The present chapter is concerned with behavior traditionally regarded as due to original nature. There is, however, at the present time, considerable controversy regarding the origin of the so-called instincts. Some authorities regard them as inherited forms of activity, while others regard them as early acquired and relatively universal habits.

Reflex action.—The simplest form of behavior response is called reflex action. This is a reaction to a simple stimulus, and the neural connections involved are no doubt determined by original nature. Reflexes differ considerably with reference to their conscious aspects. The simplest reflexes, such as the pupil reflex and various tendon reflexes, have little or no conscious aspect; but the more complex reflexes are usually experienced by the subject as conscious impulses or drives. This is the case in such reflex behavior as coughing, hiccoughing, sneezing, yawning, laughing, and crying.

Some of these complex or compound reflexes take the form of "chain reflexes." In a chain reflex the first response is a stimulus for the second, the second for the third, and so on. This may be illustrated by the locomo-

tion of the earthworm. The response of the first segment exerts a mechanical pull which arouses a response in the second segment, and the responses of the following segments are initiated in a similar way. An example of a chain reflex in a human being is the food-taking behavior of the infant. Certain tactual and thermal stimuli elicit the movements of sucking. These are followed by swallowing, swallowing by digestive responses, and so on.

Sherrington has distinguished between *allied* and *antagonistic* reflexes.[1] The former are reflexes which reënforce or facilitate each other. This relationship is found between the "extensor thrust" of the hind leg of a dog and the withdrawal response of his contralateral forefoot. Antagonistic reflexes are those which inhibit each other, as in the case of the "extensor thrust" and the "scratch reflex" of the dog. A similar relationship obtains between reflexes, and between more complex forms of behavior in a human being. So-called instinctive and habitual responses may be allied, as in the case of domineering and fighting behavior; or they may be antagonistic, as in the case of fighting and running away, or domination and submission. In all these cases the inhibition and facilitation are functions of the central nervous system.

A reflex action is originally aroused by some very definite stimulus. For example, a beam of light causes the pupil to contract, and the smell or taste of food results in the secretion of saliva. As a result of experience, however, the reflex may come to be aroused by some other stimulus. It is then called a "conditioned reflex." Pavlov has studied the conditioning of the salivary reflex of the

[1] C. S. Sherrington, *Integrative Action of the Nervous System.*

dog.[2] Saliva is secreted every time food is presented to the dog. But if a bell is rung whenever the food is presented for a number of trials, then saliva is secreted when the bell is rung without the presentation of food. The salivary reflex has become "conditioned" to the sound. In the same way other reflexes may be conditioned experimentally. Such conditioning also occurs as the result of chance associations in everyday life.

It is a question whether *walking* should be classed as reflex behavior or as habit. The common opinion is that a child must learn to walk, and observation of his first attempts would seem to corroborate this view. On the other hand, the apparent progressive improvement in walking may be due to strengthening of the muscles and to maturation of inherited neural connections. The consensus of psychological opinion favors the latter view. If walking is regarded as reflex and original behavior, it follows that it is no more necessary to teach a child to walk than to teach him to crawl or to cry. He will walk anyway, when his muscles are strong enough and the inherited neural coördinations become established.

Random movements.—Under this heading may be included many of the common behavior responses of the infant. It includes such forms of behavior as stretching, twitching, vocalizing, and the spontaneous movements of fingers, toes, and legs, as the baby lies in its crib. These random movements are distinguished from reflexes by the fact that there appears to be no definite stimulus, or the stimulus is not easily identified. Moreover, in the case of reflexes there are presumably fixed and definite neural connections which determine the responses. In random

[2] I. P. Pavlov, *Conditioned Reflexes*, translated by G. V. Anrep (Oxford University Press, 1927).

movements there may be no such fixed connections, but the responses result from an overflow of neural energy through the nervous system. These random movements are of considerable importance in the formation of habit. They may be regarded as the elements which become coordinated and organized into habits of skill.

Autonomic responses.—The autonomic responses may be regarded as either reflexes or random movements. They include such activities as the movements of respiration, circulation, digestion, and the responses of the various glands. The stimuli for the normal autonomic functions are matters of controversy. They are changes of some sort within the organism, and may even be within the nervous system itself. Abnormally increased or decreased activity of the autonomic apparatus may likewise be due to abnormal internal changes, but in addition they may be due in part to external stimuli. The perception of a pleasant or unpleasant external situation frequently has a marked effect on the autonomic functions. Autonomic responses, like other reflexes, may be conditioned to various internal or external stimuli.

Instincts.—The term "instinct" is frequently used in a very loose and indefinite way in popular language and literature. Instinct is often regarded as some mysterious power or magic potency which causes a person to do certain things. Even among scientists there is no definite consensus of opinion regarding the nature of instinct. Some regard an instinct as merely a form of behavior more complex than reflex action. Others regard instinct as a felt impulse, drive, or urge of a particular kind. These two points of view are probably both correct. An instinct may be objectively a *pattern reaction,* and at the same time subjectively a fundamental *impulse* or *drive*. As a

behavior pattern, it is determined by a neural pattern, and as an impulse, it is the subjective aspect of innervation of this same neural pattern.

At the present time there is considerable difference of opinion among psychologists on the question whether these fundamental pattern reactions or drives are inherited or acquired during the earliest years of life. The advocates of inheritance point to the fact that instinctive impulses or forms of behavior are universal among men, and are also found among the lower animals, particularly the mammals. On the other hand, the advocates of acquisition assert that their universality is greatly exaggerated, and that even if they are universal they may nevertheless be acquired, for the environmental situations of early life are everywhere more or less similar. The so-called instincts are thus relatively universal habits developed in common situations, especially in relation to social groups such as the family and the community.

In this book the point of view is taken that the instincts are subjectively drives or impulses, and objectively pattern reactions. These impulses and pattern reactions are relatively *universal* among mankind, and are *primary* in the sense that they are not based upon or derived from other drives and modes of behavior. They are therefore of fundamental importance in psychology. An instinct as thus defined may be due to original nature, may be acquired in early life, or may be in part original and in part acquired. There are only two criteria of an instinct, namely, universality and primariness; and an instinct need not necessarily be innate or inherited. Habits as distinguished from instincts are less universal and elemental impulses and patterns of behavior, and are with certainty acquired during the lifetime of the individual.

The chief instincts.—The most important universal and primary drives or pattern reactions may be classified as follows: (1) nutritive instincts, (2) reproductive instincts, (3) ego instincts, (4) defensive instincts, (5) social instincts, and (6) other instincts perhaps of a less fundamental nature. Each of the instinctive drives or responses is set off by a more or less definite stimulus or situation, and the responses in the beginning are also more or less definite patterns of behavior.

The *nutritive instincts* include all responses connected with nutrition such as the search for food, feeding, the digestive processes, and the processes of assimilation and excretion. The food-taking response is dependent in part upon the presence of food, and in part upon the condition of the organism. In some cases the external stimulus is sufficient to set off the response, and in other cases the hunger sensation and organic condition result in the development of a strong drive which may lead to a protracted search for food.

There are two instincts which may be classified under the heading "reproductive," namely, the sexual instinct and the parental instinct. These are two quite distinct impulses or drives, and they are likewise distinct as modes of behavior. The stimulus for the *sexual instinct,* in addition to organic condition, is usually a member of the opposite sex, and the responses are normally those of wooing and mating. But according to Freud this instinct goes through a number of stages in the course of its development. At these different stages the stimulus and the response may both differ considerably. The first stage he calls the "autosexual stage," when the sex object is one's own body. The second stage is the "bisexual stage," when the sexual object may be of either sex; and the third and

final stage is the normal "heterosexual stage." A fixation of development at the first or second stage results in so-called "sex perversion" which will be discussed later in this chapter.

The *parental instinct* is aroused by a child, especially by a child in distress, and the behavior is that described as "mothering" or protective behavior. This instinct has considerable social significance. As a result of experience and association it becomes aroused by various objects and conditions and leads to all sorts of educational and philanthropic endeavors. It is thus the main incentive towards social amelioration and all true social service. Both the parental and the sexual instincts are no doubt universal and primary in human beings and many of the higher animals, and it seems highly probable that they are due to original nature at least in part.

The ego instincts include a number of very important drives. The first is *domination* or *self-assertion.* This is the tendency to assert oneself, to command, or to dominate as much of the world as possible. It is the "will-to-power" of the philosophers. A second closely allied form of the ego instinct is *self-display.* This is the impulse to get attention, to show off, to seek the limelight. A third ego instinct is *submission.* This is the opposite of self-assertion. It is the tendency to follow, or to submit to the will of others. McDougall regards these tendencies as due to original nature, and points out that the original stimulus to self-assertion is the presence of an inferior member of the same species, while the original stimulus to submission is the presence of a superior.[3] He refers, in illustration, to the dignified behavior of a large dog in the pres-

[3] William McDougall, *Introduction to Social Psychology* (Methuen, 1919).

ence of a small one, and the crouching behavior of a small dog in the presence of a large one. He also points out that ego behavior among children is similar to this, and that, in the case of adults, mental or social superiority and inferiority become substituted for physical largeness and smallness.

The defensive instincts include various impulses and forms of behavior that are aroused primarily in a dangerous situation. One of these is *pugnacity*, the impulse to destroy the dangerous object. Pugnacity also arises whenever there is any check or obstruction to any other fundamental drive. The tendency is to attack or destroy the obstacle. Another defensive instinct is the tendency to *escape* from the dangerous situation. The instinct to escape takes two forms, which are to run away, or to lie perfectly still. In some species of animals the running away response is more likely to occur, in others, the remaining motionless. The latter response is sometimes called the "death-feigning" instinct. A third defensive instinct is *repulsion*. In the instinct of escape the tendency is to get away from the dangerous situation. In repulsion the tendency is to remove the dangerous object or thing from oneself. It may take the form of spitting out of the mouth ill-tasting and therefore probably noxious substances, or of quickly casting off small creatures such as insects from contact with the body.

Many of the instincts are essentially social in the sense that they arise in social situations, but there are certain tendencies which may in a narrower sense be described as social instincts. One of these is the *gregarious* tendency. This is the tendency referred to in the common saying, "Birds of a feather flock together." In a gregarious species the individual is restless and discontented when alone, and

satisfied when he is a member of a group. It is this comparatively universal tendency that leads people to congregate in the large cities when there is more space, fresh air and sunshine in the country. An individual may, however, be gregarious without being sociable in the commonly accepted meaning of the term. Various other instincts and habits are involved in sociability.

Among the social instincts *imitation* should perhaps be included. This is the tendency to do what other persons do. The tendency may be unconscious, partly conscious, or fully conscious; and it is stronger if the other person has prestige, or if the action imitated is performed by a large number of persons. Imitation is discussed in greater detail in a succeeding chapter. The *responsiveness* of an individual to social approval or disapproval is also a very general tendency. It may be regarded as belonging to either the ego instincts or the social instincts. This responsiveness is an extremely important factor in the formation of social habits, and in the development of character.

There are some other so-called instincts which are perhaps of a less fundamental nature, for they may be analyzed into, derived from, or based upon one or more of the instincts already considered. One of these is *curiosity*. This is the impulse to manipulate objects and to explore the environment. It may perhaps be a manifestation of the nutritive, ego, or sex drives rather than a primary instinct. The *instinct of acquisition* is also of doubtful primariness. The tendency to hoard and collect objects is relatively universal, but it may be based upon the nutritive instinct, or it may be a means of satisfying the impulse to dominate.

A *constructive instinct* is likewise frequently mentioned. This tendency to build may be illustrated by the

nest-building of birds. In man it is sometimes called the "instinct of workmanship." It is very questionable, however, whether this tendency is universal among men, and it is obviously subservient to other more fundamental drives. The same is true of the *instinct of destruction.* There is probably no such primary or universal tendency. The destructiveness of children is rather the outcome of other instinctive drives and of play activity.

Conditioning of the instincts.—The instinctive drives or pattern reactions are at the beginning, either because of original nature or early acquisition, elicited by fairly definite stimuli or situations. As a result of further experience, however, an instinct comes to be aroused by other objects or situations which were associated with the first stimulus. This sensory modification occurs in relation to all the instincts. For example, self-assertion may be aroused in children by physically inferior persons. It comes later to be aroused by socially or intellectually inferior persons. Similarly, the parental or protective instinct which is at first aroused by the small child in distress comes through association to be aroused by any small child, animal or object, or by any person in distress. In the same way, many situations which elicit responses of pugnacity or escape are determined through association in past experience. This process of associating an instinctive response with a different situation may be called "the conditioning of an instinct" by analogy with the conditioned reflex. It must be remembered, however, that the term "conditioned response" used in this connection has a much less exact meaning than the term "conditioned reflex."

Modification of instinctive responses.—The instinctive responses or pattern reactions, whether inherited or

acquired, undergo continuous change and modification during the lifetime of the individual. The conscious impulses or drives remain, however, very much the same. Modification of the pattern reaction is a matter of the elimination of certain responses and the formation of others. This change takes place, as a rule, in response to the social demand. A more socially desirable or acceptable response is usually substituted for a more primitive one. This process is essentially what is described by the psychoanalysts as "sublimation." It may be illustrated by the pugnacious instinct. If this instinct were expressed in its original form, striking, kicking, or biting, the subject would come into conflict with law and order. It may, however, be modified into scientific boxing, games of rivalry, competition in school examinations, or writing polemical articles. In the same way the instinct of self-assertion may be modified from a crude physical method of dominating into more and more subtle and indirect ways of achieving the desired end. So, also, sex behavior is very greatly modified in civilized communities by more and more refined and complicated methods of wooing and wedding.

The fundamental importance of the drive.—In all these sensory and motor modifications of the instinctive stimuli and responses, the conscious impulses or drives remain relatively unchanged. It is a question whether all the instinctive drives are the same in nature or whether they can be distinguished as drives. McDougall has differentiated the instincts by reference to their emotional accompaniments. He believes that each instinct is accompanied by a characteristic emotion which distinguishes it from the other instincts. For example, pugnacity is accompanied by anger, escape by fear, the parental instinct

by the tender emotion, and so on. Such an affective differentiation of the instincts is not altogether satisfactory, in as much as instincts frequently appear to have no emotional accompaniment whatever.

Instincts have also been differentiated cognitively by referring to the end or aim of the drive. For example, food is the aim of the nutritive instinct, a mate of the sex instinct, and so forth. This end or aim is not, however, an integral part of the instinct. It may be possible to differentiate the instincts conatively, that is, by the nature of the impulses themselves, but this has not yet been done. The task is a difficult one, for the impulses must be compared introspectively as impulses, apart from the emotions, cognitions, or other mental processes that may accompany them.

The various impulses may be regarded as parts or aspects of a general drive or "energy of life." In addition to instinctive drives or impulses, this energy is expressed also in other drives of an individual nature. Well-established individual habits have their own drives. The instinctive drives are those which appear to be relatively universal and primary, regardless of whether they are themselves also habit drives, or original impulses.

Conflict between instincts.—The universal drives described above frequently come into conflict with each other; the tendency to escape in conflict with the tendency to fight, the impulse to dominate with the impulse to submit, the ego instincts with the sex instinct, the sex instinct with the instinct of pugnacity, and so forth. Instinctive impulses may also conflict with habit impulses, and habit impulses with each other. Such conflicts between impulses result in feelings of anxiety which, if long continued, may have serious consequences. If the conflict

is particularly intense, one of the antagonistic impulses may be pushed out of consciousness altogether. This is what the psychoanalysts call "repression." The repressed impulse may, however, remain active outside of consciousness, and may express itself in various indirect ways. These will be discussed in Chapter XXII, "Mental Conflict and Its Consequences."

ABNORMALITIES OF REFLEXES AND INSTINCTS

All the reflex and instinctive responses and impulses vary in degree from individual to individual. No doubt if the intensity of the impulses or responses could be measured in a random sample of the population at large, it would be found that their amounts were distributed like other traits in conformity with the normal curve of distribution. The largest proportion of the population would thus be grouped about a median amount of impulse or response, and there would be fewer persons possessing smaller and greater amounts. The more extreme deviations from this median or central tendency would be the abnormalities.

The common abnormalities of reflexes and instincts are thus quantitative in nature. They are subnormalities or supernormalities. But a third class of abnormalities is possible here as in the other mental processes. These may be regarded as qualitative abnormalities. The reflex or the instinct may be aroused by an unusual stimulus or situation. The conditioned reflex is thus an abnormal because an unusual reflex. An instinct may also be abnormal in the same sense. Another kind of qualitative abnormality is a very unusual or peculiar response to a normal situation.

The abnormalities of instinct may be regarded objec-

tively as variations in the pattern reaction, and subjectively as variations in the conscious drive. The latter are the "abnormal impulses" so much discussed in popular literature. There are, of course, abnormal habit impulses as well as abnormal instinctive impulses. In other words, the individual drives may be abnormal as well as the more fundamental and universal drives. All these abnormalities, whether quantitative or qualitative, may be due to pathological causes, but they are more frequently merely constitutional variations of an inherited or acquired nature.

Paralysis.—This is usually a complete loss of motor function, including reflex action, random movement, instinctive response, and habitual activity. It may involve any larger or smaller group of muscles. An incomplete paralysis or weakening of a muscle group is sometimes called "paresis." Paralysis is analogous to anesthesia. It involves the motor mechanism just as anesthesia involves the sensory mechanism. The former is a loss of motor capacity, the latter a loss of sensory capacity. Paralysis like anesthesia may be organic or functional. *Organic paralysis* is due to a lesion somewhere in the motor pathway, in the upper motor neurons, in the lower motor neurons, or in the peripheral nerves.

Functional paralysis is analogous to functional anesthesia. It is probably due to a functional dissociation, a blocking of synapses, involving a motor area of the cortex. Functional paralyses are frequently transient and changeable, but in some cases they may persist for months or even years. In functional paralysis the reflexes in the paralyzed area are preserved. This may also occur in an organic paralysis, if it involves the upper motor neurons. Functional paralysis may not be complete. A limb may

be paralyzed for some functions and not for others. For example, a person may be unable to walk but may be able to move the legs about when sitting down. Functional paralysis may be cured by psychotherapeutic methods, by religious convictions, or by shock. These factors probably operate by breaking down the blocking and reconnecting the dissociated motor neurograms with the rest of the brain.

Abnormalities of reflexes.—Any reflex may be exaggerated, weakened, or altogether absent. These variations in reflexes have considerable significance in the diagnosis of nervous and mental diseases. The many reflexes and their disorders need not be further considered here, as they are fully described in the various textbooks of neurology and neuropathology. There are also significant abnormalities in the more complex reflex coördinations, such as standing and walking. The absence of simple reflex coördinations is called "ataxia." It sometimes occurs as an inability to stand erect when the eyes are closed and the feet placed close together. Disorders in walking are also relatively common. There are peculiar "gaits" characteristic of certain nervous diseases, such as the "paretic gait," the "hemiplegic gait," and the "festinating gait" of paralysis agitans.

Abnormalities of the nutritive instinct.—In connection with the nutritive instinct it is important to distinguish between hunger and appetite. Hunger is a sensation due to tonic contraction of the stomach walls occurring when it is relatively empty. Appetite is the craving for food, which is fundamentally instinctive in nature. This instinctive craving may be a response to the hunger sensation or to other sensations, such as the taste, smell, or appearance of food. Hunger sensation, like other

sensations, may also be abnormally decreased or increased in intensity, but here we are chiefly concerned with the abnormalities of appetite.

Appetite, the instinctive impulse or craving for food, may be abnormally diminished in intensity. This is called *anorexia*. It may be due to an absence of the hunger sensation, or to other factors; and it is one cause of the frequently occurring refusal of food particularly by mental patients. Appetite may be abnormally increased in intensity, and this is called *bulimia*. It may result in excessive ingestion of food, and in lack of discrimination with reference to food. Perhaps the most interesting form of abnormality of appetite is *parorexia*. This is a qualitative anomaly. It is an abnormal craving for unusual kinds of food, sometimes for inedible substances such as clay, chalk, or filth.

Abnormalities of the sex instinct.—In the case of the sex instinct, it is important to distinguish between fundamental abnormalities and unusual sex practices. This is a distinction between abnormalities in the sex drive or craving, and unusual sex practices or habits which may be resorted to not by preference, but in lieu of the actually desired sex activity. On the other hand, a fundamental abnormality in the sexual impulse may occur without any overt sexual indulgence. There are numerous peculiar and unusual sex practices or forms of sexual indulgence, but only some of the fundamental abnormalities will be described here.

The chief sexual abnormalities readily fall into two main groups: anomalies of degree, and qualitative anomalies. The anomalies of degree are of two varieties. First, *anesthesia sexualis* or sexual frigidity, a diminution of the sex drive; and second, *hyperesthesia sexualis* or eroticism,

an increase of the sexual craving. If the latter occurs in a man it is called "satyriasis"; if it occurs in a woman it is called "nymphomania."

The qualitative anomalies may also be divided into two main groups. First, anomalies in which the sexual instinct is aroused by an unusual stimulus or object; and second, anomalies in which the sexual response or behavior takes an unusual form. These two kinds of qualitative abnormalities generally occur together, since one usually involves the other. An abnormality mainly of the first sort is *autosexuality* or *auto-eroticism.* In this case there is no sexual object other than the subject's own body. Autosexuality is likely to result in the practice of masturbation. But it is important to bear in mind that this practice may also occur without any fundamental autosexuality.

Autosexuality represents an early stage in sexual development, and masturbation is thus a normal phenomenon in young children. It should therefore not be treated as a wicked or perverted habit, but rather with indifference. The child who develops normally and has normal work and play interests is certain to outgrow this stage of his sexual development.

In this connection it is necessary to emphasize the fact that the serious consequences of masturbation in youth and adult life have been greatly exaggerated. The consensus of opinion of the leading authorities on the subject is that masturbation is not more likely to be harmful than any other form of sexual activity. Any harm that may result from this or other forms of sexual indulgence is due not to the act itself, but to the mental conflict and worry which it may precipitate. It only increases this worry to be told of the dire consequences of the habit, and

physicians in the past have no doubt caused considerable harm by stressing this aspect of the subject.

A second abnormality in respect to the sexual object is *homosexuality,* or sexual inversion. In this case the sexual craving is directed towards a person of the same sex. There are various degrees and forms of homosexuality. In some cases the homosexual person has the bodily form or the mental make-up of a person of the opposite sex. The homosexual man is effeminate, or the homosexual woman is masculine in physical or mental characteristics. In other cases, however, the homosexual person has none of these mental or physical characteristics, but may be quite normal in all other respects.

A homosexual person is frequently bisexual. In other words, there may be a sexual interest in either the opposite or the same sex. Freud believes that bisexuality represents a stage in sexual development following autosexuality, and that homosexuality in an adult is due to a fixation of development at this stage. There may also occur, in addition to this fixation, a repression of the heterosexual component of bisexuality.[4] This theory probably accounts for homosexuality in otherwise normal persons. In those cases where homosexuality is accompanied by the mental, and particularly the physical characteristics of the opposite sex, the perversion may be due to glandular disorder or defect.

Homosexuality occurs in both men and women, and is probably much more common than is usually supposed. It is possible, of course, to be fundamentally homosexual without indulging in homosexual practices, and *vice versa* indulgence in homosexual practices does not necessarily

[4] Sigmund Freud, *Three Contributions to Sexual Theory,* Nervous and Mental Disease Monographs, No. 7 (3rd ed., 1918).

indicate a fundamental homosexuality. A homosexual instinct may form the nucleus of a sentiment of homosexual love, just as a normal sexual instinct may form the nucleus of a sentiment of heterosexual love. This may account in part for the "crushes" and hero worship of adolescence. These must not, however, be regarded as very abnormal phenomena. They occur before the individual has outgrown the bisexual stage of his development.

There are many other abnormalities of the sexual instinct with reference to the sex object. For example, the object may be an animal, an immature child, or even an inanimate object. The last mentioned case is of special interest. If the sexual impulse is aroused by some inanimate object, it leads also to marked deviations in sexual behavior. This form of sex abnormality is known as "sexual fetishism." *Fetishism* may be due to the conditioning of the sexual instinct to some object associated with the original sex object, such as a handkerchief, shoe, glove, hair, or lingerie. It frequently results in a mania for collecting these objects, and may occasionally lead the subject into crime such as theft or hair-snipping (in the days of long hair).

Other abnormalities of the sex instinct pertain more particularly to the sexual response or behavior. One class of such abnormalities appears to be due to an exaggeration of the preliminary or preparatory sexual impulses and behavior such as touching and looking. *Exhibitionism* and *inspectionism* belong in this category. The former is the tendency to exhibit or expose oneself sexually, while the latter is the tendency to see and examine the sex object. These abnormalities are simply exaggerations of certain common tendencies, but they are of considerable

forensic importance. Exhibitionists and "peeping Toms" frequently make themselves a public nuisance.

Another pair of sexual abnormalities pertaining chiefly to sex behavior are *sadism* and *masochism*. Sadism is the gratification of the sexual impulse by cruelty, that is, by inflicting pain upon the object of lust. Masochism, on the other hand, is the gratification of the sexual impulse by suffering pain. Both sadism and masochism are usually found in the same person, and masochism may be regarded as sadism directed against oneself. According to the psychoanalysts these abnormalities are merely exaggerations of universal human tendencies or components of the sexual instinct. Their exaggeration may be determined in part by the process of conditioning in the past experience of the subject. In this process cruelty or pain may become associated with the sexual drive and with sexual pleasure.

Both sadism and masochism may occur in symbolic forms. In these forms the subject's impulses are satisfied by the humiliation of the object of sexual desire, or by submissiveness and self-sacrifice. Such abnormalities are thus closely related to the ego instincts, and are sometimes interpreted as abnormalities of these instincts. On the other hand, sadism and masochism may both take an extreme physical form, resulting, on the one hand, in mutilation of the victim and perhaps in so-called "lust murder," and on the other hand in self-mutilation and perhaps even suicide.

The sexual instinct may be prematurely developed in children or reawakened in late senility, and there are also other abnormalities too numerous to describe here. In general, all abnormalities of this instinct are extreme variations of relatively universal impulses or pattern re-

actions and they are due either to fixation and failure in the process of development, or to conditioning of certain trends as a result of early experience. A few of them may be due to glandular disturbances. For example, a persistent thymus gland may retard sexual development; and the presence of glandular tissue of the opposite sex may account for some forms of homosexuality.

Abnormalities of the ego instincts.—The abnormalities of the ego instincts, like those of the sex instinct, fall into two general classes, quantitative anomalies and qualitative anomalies. The chief *anomalies of degree* are: the feeling of inferiority, extreme submissiveness or self-depreciation; the feeling of superiority, extreme self-assertion and egotism; and, closely allied to the latter, an exaggerated tendency to self-display and showing off. These abnormalities may be due to an innate excess or deficiency of the instincts concerned, or they may be due to early environmental influences.

Such environmental factors as harsh treatment, oppression and criticism in childhood may produce a feeling of inferiority. This feeling of inferiority may persist throughout life, or it may be repressed and become an unconscious "inferiority complex." In the latter case the subject may overcompensate for his inferiority by an extreme egotism and aggressiveness, or he may express his complex in various indirect ways. An actual physical defect or deformity may also produce a feeling of inferiority with similar consequences. Moreover, the constant association with superior persons may produce a like effect, while the constant association with inferior persons may result in an exaggerated feeling of importance. The association with inferiors permits too much expression of self-assertion and display, while constant association with

superiors permits too little expression of these important trends.

The *qualitative anomalies* of the ego instincts are the various unusual or indirect methods of expressing them which arise when their direct expression is found unsatisfactory or socially undesirable. One of these methods has been described by Adler as "winning by yielding." [5] This is the method employed by the coquette, male or female. The individual dominates in various subtle ways through submissiveness, modesty, and coyness. Adler also describes the "derogatory impulse." This is the tendency to emphasize one's importance and position by criticizing, shaming, or disparaging others. If a person cannot attain a superior position by direct and aggressive means, he can at least gain a relative advantage by showing the inferiority of others.

Another indirect method of gaining attention is through delinquency. It is common among school children, and even among older persons, to "excel by being the worst." If a person cannot gain attention by socially acceptable means he can at least force attention by stealing, lying, cruelty, or by general incorrigibility. The ego drive may thus be at the basis of much delinquency and crime. Even rape and other sexual irregularities may be motivated more by the desire to prove one's potency and superiority than by the sexual instinct in the narrow sense. Obstinacy or stubbornness is another common trait which may be based upon self-assertion. But on the other hand, it may be an overcompensation to protect the subject against a strong submissive or suggestible tendency.

The physician will be particularly interested in those

[5] Alfred Adler, *The Neurotic Constitution*, translated by Bernard Glück and J. E. Lind (Moffat, Yard, 1917).

cases wherein actual sickness is motivated by a desire to gain sympathy and attention. In this connection it is important to distinguish between the case of a patient who is conscious of the desire for attention or sympathy and knows his illness is simulated for this purpose, and that of a patient who is quite unconscious of any such motive or of the relation of the motive to his illness. The former is an instance of malingering, the latter of hysteria or some other functional neurosis. In the latter case the therapeutic procedure is to make the patient conscious of his motive and suggest other means of satisfying it. Illness based upon the impulse to dominate or get attention is analogous to illness determined by the wish to avoid an unpleasant task or duty. It is a form of what the psychoanalysts call "flight from reality."

Abnormalities of the defensive instincts.—These are abnormalities in the impulses to escape, to repel, and to fight. Such impulses may be markedly increased in intensity, so that a person is unable to resist them. He may run away in the face of tremendous odds, or he may rush rashly into danger. On the other hand, these impulses may be greatly decreased in intensity, so that the subject does not try to escape in an obviously dangerous situation, or shows no tendency to fight when there are manifest causes for such behavior. The tendencies to escape, to repel objects, or to fight, may also be aroused in very unusual situations which present no danger whatever. For example, repulsion in the form of vomiting may occur in neurotic persons on the slightest provocation and in unpleasant situations that have no apparent connection with the taste of food. The abnormalities of these defensive instincts are usually accompanied by marked emotional disturbances which will be described in Chapter XI.

Abnormalities of the social instincts.—These instincts may also show marked deviations from the normal. A considerable lack of gregariousness is shown by many persons who prefer solitude and a lonely environment. On the other hand, an unusual degree of gregariousness is manifested by some persons for whom solitude is the greatest possible misery. This form of abnormal gregariousness is well described by Edgar Allan Poe in a story entitled, "The Man of the Crowd." This man spends the day wandering about from one part of the city of London to another, seeking out the most crowded sections of the hour. He speaks to no one but is always dominated by the overwhelming impulse to be with the crowd. Sensitivity to social approval and disapproval also varies considerably among individuals, and there may be a marked deficiency or a very great excess of sensitivity in this respect. In other words, an individual may be "thick-skinned," or "touchy." Abnormal variations also occur in imitativeness, which is described in Chapter XVIII.

Abnormalities of other instincts.—The other instinctive tendencies also show interesting deviations from the normal. There may be deficiency or excess of the parental instinct. Some persons are dominated by the impulse to "mother," to protect and to help, while others have apparently no inclinations of this kind whatever. There may likewise be diminution or exaggeration of the acquisitive instinct (or habit). In the former case the individual is likely to be a spendthrift or "ne'er-do-well," while in the latter case he becomes a miser, or even a kleptomaniac. Another deviation of this instinct is the tendency to collect useless objects, which is found frequently in children and sometimes in senility.

The instinct of curiosity may also be abnormal in sim-

ilar ways. Lack of curiosity of course results in lack of information and knowledge; while exaggerated curiosity results in search for knowledge and application to science for its own sake. If curiosity is misdirected, it may lead to mere inquisitiveness and prying into other people's business. The constructive tendency may show similar deviations in aim, and if not properly directed may manifest itself in the production of undesirable and useless inventions or literary compositions.

The consideration of abnormal instincts leads directly to a consideration of abnormal habits, for both instincts and habits are subjectively impulses, and objectively pattern reactions. The difference between them is chiefly a matter of the greater universality of the instincts, and perhaps their greater dependency upon heredity. Many of the so-called uncontrollable impulses of everyday life are habit impulses rather than instinctive ones. For example, pyromania, or the impulse to set fires, is no doubt a habit impulse. There is no universal tendency of this sort. Impulses are therefore further considered in Chapter XII, "Habit and Learning."

CHAPTER X

FEELING

Feeling is a form of affection. The term "affection" as used in psychology has a broader meaning than in everyday life. In psychology it includes all feelingful experiences and not merely those allied to love. Affection is thus distinguished from conation which consists of the impulses, urges, or drives to action. Affection is also distinguished from cognition. The former represents chiefly the state of the organism itself, while the latter represents chiefly the external conditions. The former is dependent mainly upon the activity of the interoceptors and proprioceptors, while the latter is dependent mainly upon the exteroceptors. It follows that affection plays an important rôle in the internal adjustments of the organism, while cognition plays its chief part in adjustments to external conditions.

Affection or affective processes include feelings, emotions, sentiments, moods and temperament. Some of these processes such as feelings are simple, others such as sentiments are exceedingly complex. A sentiment includes ideas and impulses as well as feelings and emotions. The affective processes are often called "affects." The affects, like the behavior responses described in the last chapter, are probably in part inherited, but are also in part determined by environmental influences. Experience modifies the affective life just as it modifies perception and behavior.

The feelings are the simplest affects. Thus the term "feeling" is used in psychology in a narrower sense than in popular language. Popularly it is frequently used with reference to the senses of touch or temperature, as when we say a thing "feels" rough or smooth, wet or dry, hot or cold, and so forth. The term should not be used in this sense in psychology but should refer only to simple affective qualities like pleasantness and unpleasantness. It is important also to distinguish between unpleasantness and pain. The former is a feeling, the latter a sensation. It is common in popular and poetic language to use the word "pain" to mean unpleasant feeling as well as the sensation of physical pain.

The number of feelings.—There is considerable difference of opinion regarding the number of the simple feelings. Some authorities believe they are indefinite in number, and that we only have words to express a few of them. Others believe there are two large groups of feelings, a pleasant group and an unpleasant group. Each of these groups includes a great many different kinds of feelings.

It seems probable that these different kinds of feelings can be further analyzed into simpler experiences, and that there are really only two simple and unanalyzable feelings, namely, pleasantness and unpleasantness. It has been suggested that there is also a feeling of indifference which is the affective quality of experiences that are neither pleasant nor unpleasant. It is very questionable, however, whether indifference is an actual positive quality of experience. It is rather a complete absence of feeling.

Wundt, an eminent German psychologist, advanced a theory of feeling which is known as the "tridimensional

theory." [1] According to this view there are six feelings which may be arranged into three pairs. The first pair is pleasantness and unpleasantness; the second, tension and relaxation; and the third, excitement and quiescence. It seems, however, that the experiences of tension, relaxation, excitement, and quiescence are more complex than the experiences of pleasantness and unpleasantness. The former experiences consist of kinesthetic sensations as well as simple feelings of pleasantness or unpleasantness. They therefore belong to a more complex class of phenomena which may be called "sense-feelings." This class includes also such experiences as hunger, nausea, and fatigue. Excitement is a particularly complex experience, and is probably more of the nature of emotion than of feeling in the narrow sense. Hence there are probably only two primary or elemental feelings, *pleasantness* and *unpleasantness*.

Theories of feeling.—Some authorities believe that the simple feelings of pleasantness and unpleasantness may likewise be reduced by further analysis into organic and perhaps kinesthetic sensations. These authorities usually believe that all mental life is reducible to sensations. This point of view is therefore called *sensationalism* in psychology, which is different of course from "sensationalism" as the term is used in everyday life. It may be true that affective responses, in general, are elicited by stimulation of the interoceptors, but it does not necessarily follow that as conscious experiences feelings are reducible to sensations. The feelings of pleasantness and unpleasantness appear to introspection as relatively simple and unanalyzable processes.

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[1] See E. B. Titchener, *A Text-Book of Psychology*, pp. 225-264.

Allport has suggested that the feelings may be related to the *autonomic functions*.[2] The antithesis between the pleasant and the unpleasant suggests the antithesis between the craniosacral and the sympathetic portions of the autonomic system. Unpleasantness may be related to hyperactivity of the sympathetic system, while pleasantness may be associated with hyperactivity of the craniosacral system. This is an interesting hypothesis which may contain an element of truth. On the other hand, it seems equally probable that pleasantness is the accompaniment of healthful bodily processes, and unpleasantness of disturbed physiological functions. Pleasantness would thus be related to normal balance of sympathetic and craniosacral functions, while unpleasantness would accompany hyperactivity or hypoactivity of either of these systems.

There is a similar *biological theory* of feeling according to which pleasantness always accompanies beneficial experiences and activities, and unpleasantness accompanies injurious ones. In other words, pleasantness indicates healthy external or internal adjustments, while unpleasantness indicates poor adjustments or maladjustments. There is considerable evidence in favor of this view, but, on the other hand, there are many exceptions in daily life where the injurious is experienced as pleasant or the beneficial as unpleasant. Such exceptions occur with special frequency in some mental diseases.

Another theory of feeling relates pleasantness to *facilitation* and unpleasantness to *inhibition* of neural processes. Pleasantness is thus due to ease of discharge of the nerve current, while unpleasantness is due to obstruction

[2] F. H. Allport, *Social Psychology* (Houghton Mifflin, 1924), pp. 84-98.

or blocking of such discharge. Thorndike uses the terms "satisfaction" and "annoyance" instead of pleasantness and unpleasantness. His statement of the theory is that "conduction by neurological units in readiness to conduct is satisfying, while conduction by units in unreadiness, and readiness without conduction are annoying." [3] This raises the question of the meaning of neurological readiness and unreadiness. These are probably degrees of resistance in neural pathways, and facilitation or inhibition of activity in such pathways as a result of allied or antagonistic activity elsewhere in the nervous system. The actual nature and *modus operandi* of facilitation and inhibition have never been precisely determined.

It seems certain that pleasantness and unpleasantness are dependent, at least in part, upon neural facilitation and inhibition. In everyday experience it is pleasant to do what one wants to do. It is also unpleasant not to do what one wishes, or to have to do what one prefers not to do. Such experiences can probably be translated directly into terms of neural facilitation and inhibition. Unpleasantness thus always involves some conflicting tendencies or impulses. This theory would therefore be in harmony with the view that the unpleasant is the injurious and the pleasant the beneficial and healthful, for conflicting tendencies are not in the immediate interest of the organism. Feeling is probably also in part a matter of organic sensation arising from internal adjustment. Beneficial and healthful internal organic adjustments result in pleasant feelings, while inharmonious and unhealthy organic conditions result in unpleasant feelings. The former facilitate

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[3] E. L. Thorndike, *Educational Psychology* (Columbia University Press, 1913), Vol. I, "The Original Nature of Man," pp. 123-134.

the life interests of the organism while the latter hinder them.

The relation of feeling to other mental processes.—Feeling may be associated with any mental state or process. It is obvious that sensations and perceptions may be connected with feelings. For example, the taste of sweet is in childhood usually pleasant, while the taste of bitter is unpleasant; certain combinations of tones are pleasant, others unpleasant; and the same is true of color combinations and arrangements. Memory ideas also may be associated with feelings. Some ideas are pleasant, some unpleasant. Instinctive impulses may likewise be pleasant or unpleasant, depending chiefly upon the past experience of the individual in instinct-producing situations. The pugnacious impulse, for example, may be pleasant under certain conditions and unpleasant under others. Even emotion may be either pleasant or unpleasant according to circumstances. Some emotions like elation are usually pleasant, others like fear are usually unpleasant. But on occasion the feeling accompaniment may be changed so that elation can be unpleasant and fear actually pleasant. The relation of feeling to the other mental processes is dependent mainly upon experience.

Mixed feelings.—The question is sometimes raised whether the feelings of pleasantness and unpleasantness can occur together, or whether they are always mutually exclusive. It seems certain that we approach many situations in life with mixed feelings. Feelings of pleasantness and unpleasantness may be aroused by the same person, by the same food, or by other things in everyday life. Some psychologists maintain that in these cases the feelings follow each other in rapid succession. Others believe that they may exist simultaneously. This problem is a

more or less academic one. In actual experience the feelings seem mixed, and it matters very little except in theory whether this experience is ultimately a simultaneous or a successive occurrence of pleasantness and unpleasantness.

The acquisition and modification of feelings.—Feelings are acquired and modified in various ways as a result of experience. A frequent occurrence is the attachment of a feeling to an object or situation, as when something originally indifferent becomes either pleasant or unpleasant. A modification of feeling occurs when the affective tone already connected with a situation becomes changed into its opposite, as when an originally unpleasant situation becomes pleasant, or a pleasant one becomes unpleasant. A "feelingful" situation may likewise become indifferent as a result of experience.

Changes in feeling may result in the formation of likes or dislikes. One learns to like or dislike anything which has become associated with pleasant or unpleasant feelings in his past experience. For example, if one dislikes some particular article of food he may learn to like it, if he eats it on a number of occasions in pleasant situations. The pleasantness of the situation becomes conditioned to or associated with the food. In this way a person may learn to like bitter or unusual substances, such as beer or ripe olives. Similarly he may learn to like or dislike persons, customs, places, animals and anything with which he comes in contact. Feelings not only tend to become transferred from one thing to another, but they also tend to spread over the whole mental life. A feeling of pleasantness or unpleasantness aroused by some particular object may thus diffuse itself through consciousness and cast its glow or its shadow over all one thinks, feels, or does.

It is quite problematic how this learning of feelings takes place neurologically. If the feelings are correlated with special neural centers or systems, then the learning would be due to the formation of connections between the neural patterns for feeling and the neural patterns for other mental processes in conformity with the general law of association. On the other hand, if feeling is a matter of neural inhibition and facilitation, then modification of feeling would be due to increase or reduction of resistance in neural pathways. Custom and practice would tend to increase the pleasantness of a situation or response, while fatigue and other inhibiting factors would increase their unpleasantness. It is true that we like what we are accustomed to, and frequently dislike the unusual and the difficult.

Laughter and weeping.—Laughter and weeping may be due to extremes of feeling. Extreme pleasantness is expressed in smiling and often in audible laughter, while extreme unpleasantness is expressed in frowning and perhaps in actual tears. In the case of children these extreme feelings seem to be the fundamental causes of laughter and weeping. In the case of adults the problem becomes more complicated. Both laughter and weeping have many causes, and volumes have been written on these subjects. However, no matter how numerous the causes of these phenomena may be, there is no doubt that extremes of feeling remain throughout life of basic importance in explaining them.

ABNORMALITIES OF FEELING

The abnormalities of feeling usually occur along with other mental anomalies such as aberrations of instinct and emotion, and it is rare in ordinary experience or in medical

practice to find a case of abnormal feeling alone. The abnormalities of feeling may be classified into quantitative and qualitative abnormalities. The former are either excess or deficiency of feeling, while the latter are feelings aroused in unusual situations or related in an unusual way to other mental processes.

Excess of feeling.—The feeling of pleasantness may be very much exaggerated. The subject then sees the world through rose-colored spectacles. This abnormality is found in maniacal conditions, in mild alcoholic intoxication, and in the exalted moments in everyday life. On such occasions a person has a happy and optimistic attitude. The feeling of unpleasantness may likewise be exaggerated. This occurs in melancholic states, sometimes in fatigue, and in the depressed phases of everyday life. The subject has in such cases a gloomy and pessimistic outlook.

The sense-feelings of tension and excitement are also frequently increased in intensity, especially in anxious and restless conditions. Similarly the sense-feelings of relaxation and quiescence are intensified in certain conditions, such as manic stupor, ecstasy, and some forms of religious exaltation. Excess of pleasantness or unpleasantness is, however, a more basic abnormality. It is probably due to general organic conditions, or to marked facilitation or inhibition of neural processes.

Diminution of feeling.—The feelings of pleasantness and unpleasantness may be decreased in intensity, or they may be absent altogether. This is called "apathy" or morbid indifference. It is frequently found in the early stages of dementia præcox when there is a distinct diminution of both interests and aversions and a corresponding decrease of "pride and ambition." There are various

other mental processes involved in such symptoms, but the deterioration of feeling is of primary importance. A relative apathy or deficiency of feeling frequently occurs under certain conditions in persons who are not mentally diseased. It may follow physical illness, fatigue, trouble, or mental shock and worry.

Ribot has pointed out that when feeling and emotion deteriorate in mental disease or in senility, the disappearance of the affective experiences follows a definite course from the highly cultivated to the more fundamental and primitive forms.[4] The higher and less stable affects disappear before the lower and more primitive ones. The esthetic and intellectual affects go first, then the altruistic, and last of all the purely egoistic ones, such as those concerned in self-defense and self-preservation. Ribot has also shown that the higher affects exercise a certain control over the lower ones. Consequently in the early stages of the decay of feeling and emotion, this control disappears and there results an apparent exaggeration of the more primitive emotions.

Perversions of feeling.—These are qualitative abnormalities. A feeling arises in peculiar circumstances or in an unusual situation, and may be the exact opposite of the feeling that normally occurs. In dementia præcox the patient may smile or laugh in the midst of an apparently sad story, or he may suddenly burst into tears without any apparent cause. There is a dissociation between the feelings and the ideas. This phenomenon has been called "noo-thymopsychic ataxia." It is a form of intrapsychic ataxia or dissociation. A similar symptom may be found

[4] Théodule Ribot, *The Psychology of the Emotions* (Scribner, 1903), pp. 423-437.

in persons who are not mentally diseased, especially in childhood and adolescence when the feelings and ideas have not yet become integrated and organized. Even among adults it may occur under certain conditions, such as physical or mental fatigue, or emotional strain. For example, a person may laugh on suddenly receiving sad news, or weep in a usually pleasant situation such as a wedding.

An especially interesting perversion of feeling is the association of pleasantness with the sensation of pain. This is referred to by Ribot as "the pleasure of pain." Pain is normally an unpleasant sensation, and it seems especially paradoxical that pleasure should be aroused by physical or mental suffering. This, however, sometimes happens. It may be illustrated by the case of a patient who had a minor operation on her finger. The wound failed to heal and another operation had to be performed. After this was repeated several times, it was discovered that the patient was continually irritating the wound, thus preventing healing. She admitted that she did this because of the pleasure aroused by the pain sensation.

In the above case the pleasantness aroused by the pain was specifically a sex pleasure. In other words, the pleasure of pain was masochistic pleasure. It is not necessary, however, that the pleasure of pain should always be sex pleasure. Pleasantness may become connected with the pain sensation just as it becomes connected with any other mental process. If pain is frequently experienced in any pleasant situation, the pleasantness may become associated with, or conditioned to the pain. A certain amount of "pleasure of pain" often occurs in ordinary life in persons who find some pleasure, or at least interest in stimulating a sore corn or a loose tooth, or in picking

the scabs off sores. One of the factors causing chronic invalidism is perhaps the pleasure associated with the illness. The total situation may be one that has been particularly satisfying to the patient, and the pleasure of the situation has become at last attached to the illness itself.

Pleasure may also be derived from mental suffering. Some persons find humiliation, penance, and martyrdom pleasant experiences. Many of the small martyrs in everyday life seem to derive considerable pleasure from performing their self-imposed tasks. In such cases pleasure is aroused under unusual conditions. But there are also cases where unpleasantness occurs in situations that are usually pleasant. Ascetics, cynics, and "grouchers" seem to find the normally pleasant experiences of life distinctly unpleasant. They therefore scorn and belittle the customary pastimes of the common people.

CHAPTER XI

EMOTION

The emotions include such states or processes as anger, fear, elation, sex emotion, and the like. These processes are more complex than the simple feelings already described. They are more complex both as conscious experiences and as behavior responses. On the other hand, emotions are less complex than sentiments, such as loyalty, friendship, and esthetic appreciation. The sentiments include feelings and emotions, and also other mental processes, particularly ideas and impulses.

Theories of emotion.—Perhaps the best known theory of emotion is the so-called "James-Lange theory." This theory was originated independently by James and by Lange.[1] According to these authorities, emotion is the *consciousness of response.* The response follows immediately upon the perception of the exciting object. James emphasized particularly the skeletal reactions, while Lange emphasized the vascular reactions. Emotion is merely the complex combination of organic and kinesthetic sensations resulting from these reactions. This theory changes the sequence of events as they are ordinarily supposed to occur, for the emotion follows the response instead of preceding it. We are afraid because we run away, are angry because we strike, and so forth.

[1] The original papers by these two authors may be found in *The Emotions,* edited by Knight Dunlap (Williams & Wilkins, 1922).

Such simple illustrations, however, scarcely do justice to the theory, for, strictly speaking, we are afraid or angry because a great many internal and external responses occur in addition to running away or striking. The James-Lange theory has been subjected to severe criticism, but it nevertheless contains important truths which are very generally recognized.

Another well-known theory of emotion is that stated by McDougall.[2] According to McDougall, emotion is the *subjective aspect of instinct*. "Emotion is a felt excitement accompanying instinctive activity." There is thus an emotion for every instinct. Fear accompanies the instinct to escape, anger accompanies pugnacity, disgust accompanies repulsion, wonder accompanies curiosity, elation and subjection accompany the instincts of self-assertion and self-abasement, tender emotion accompanies the parental instinct, and so on. This theory also contains an element of truth, for emotions do frequently accompany instinctive activity. There may, however, be instinctive responses without emotion, or emotional responses without instinct. There is not the invariable connection between the instinctive response and the emotion, demanded by the theory. Moreover, the subjective aspect of instinct is impulse or drive, and emotion has its own subjective and objective aspects.

From the objective standpoint, emotion is a form of behavior. It is a *pattern reaction* involving changes of the bodily mechanism as a whole, but particularly of the visceral and glandular systems. These pattern reactions may be inherited or acquired as a result of experience. Since emotion is response mainly of the autonomic ap-

[2] William McDougall, *Introduction to Social Psychology*.

paratus, the chief reactions are organic and not readily observable. But emotion also includes some overt responses such as pallor or flushing, goose flesh, shuddering, erection of hairs, and other so-called expressive movements.[3] From the subjective point of view, an emotion is a specific form of consciousness. It is an excited or "stirred-up" state of mind, as the term implies. This mental state is introspectively analyzable into kinesthetic and organic *sensations* and *feelings* of pleasantness or unpleasantness. These sensations result from the emotional behavior responses just mentioned. This is in conformity with the James-Lange theory, but the emphasis is placed particularly on the visceral and glandular responses.

The problem of the *neurological basis* of emotion is an interesting but difficult one. It has been suggested that there may be a specific center for emotion probably in the thalami or other basal ganglia of the brain. It has long been supposed that these basal ganglia may have an affective function, and that view may ultimately be found correct. On the other hand, emotion consists of somatic and visceral sensations and feelings. The sensations have their localization in certain sensory areas of the cortex, and the feelings may be due to neural facilitation and inhibition. This would imply that emotion has no specific localization, but may involve the whole brain or various scattered areas.

Relation of emotion to instinct.—Emotion and instinct have the following points of similarity: (*a*) They are both relatively universal and primary forms of response. (*b*) They are both pattern reactions or compound

[3] For description of these, see Charles Darwin, *Expression of the Emotions in Man and Animals* (Appleton, 1873).

and more or less coördinated responses. (*c*) They are both psychophysiological responses, that is, they have bodily and conscious, or objective and subjective aspects. (*d*) They are both, as a rule, responses to more or less specific objects or situations.

They differ in the following respects: (*a*) Objectively considered, instinct is chiefly response of the proficient apparatus, that is, the sensorimotor neural mechanism and the skeletal musculature; while emotion is chiefly response of the autonomic apparatus, that is, the vegetative nervous system and the smooth muscles and glands. (*b*) Subjectively experienced, instinct is impulse or drive, while emotion is stirred-up consciousness analyzable into diffuse organic sensations and feelings.

Instinct and emotion may occur together or separately. A situation may lead at the same time to responses of both types. Thus instinct and emotion occur together. But a situation may lead to mainly skeletal response, instinct without emotion; or to mainly visceral and glandular response, emotion without instinct. The relationship between emotional and instinctive psychophysiological responses may be indicated in the following way: A situation, S^1, may lead to an instinctive psychophysiological response, *IR*, which has the two aspects, skeletal bodily response, *SB*, and instinctive consciousness, *IC*. This may be represented by the formula:

$$S^1 \rightarrow IR = SB + IC$$

Another situation, S^2, may lead to an emotional psychophysiological response, *ER*, which has likewise two aspects: visceral and glandular bodily response, *VB*, and emotional consciousness, *EC*. Thus, we have the formula:

$$S^2 \rightarrow ER = VB + EC$$

But a situation, S^3, may lead to both forms of response at once. This may be represented by the formula:

$$S^3 \begin{cases} \nearrow IR = SB + IC \\ \searrow ER = VB + EC \end{cases}$$

An example in everyday life is the relationship between the emotion of fear and the instinct to escape. An impulse to escape may occur in the absence of fear, as when one, without emotion, instinctively avoids a dangerous situation. On the other hand, an emotion of fear may occur without the impulse to escape, as when fear is due to reading a ghost story at night. But the instinct and emotion may occur together, in which case the fear reinforces the impulse to escape, as when one is chased by a bull. Similarly, pugnacity may occur without anger, anger without pugnacity, or both may occur together. The same is true of other instincts and emotions. When an emotion accompanies an instinct it tends to be of a rather specific nature. For example, fear accompanies escape, anger accompanies pugnacity, and so forth. This relationship is not, however, an invariable one.

The view has often been advanced that emotion is due to some *check or impediment to instinctive activity.* Kantor, for example, regards emotions as "no response activities." [4] They are organic reflexes which replace the original response to stimulation when there is a failure of such overt activity. Drever expresses a similar view. He draws a distinction between instinct activity and instinct interest or feeling, which is the invariable accompaniment of instinct activity. He then says: "The affective

[4] J. R. Kantor, "An Attempt toward a Naturalistic Description of Emotions," *Psychological Review,* 28 (1921), 19-43, 120-141.

element in instinct experience becomes emotion only when action in satisfaction of the interest is suspended or checked." And, "If impulse immediately realizes itself in the appropriate action towards the situation, then there is no emotion in any strict sense of emotion." [5]

The view that emotion is due to a check to instinctive activity also contains an element of truth. For, if a situation is such as would lead to a response of the projicient apparatus, and this overt activity is checked or inhibited, then the accumulated and blocked nervous energy may be drained into the autonomic apparatus. An emotional response is thus produced or, if already present, intensified; and a correlative emotional consciousness likewise occurs, or is intensified. A response of the autonomic apparatus may, however, be the primary and appropriate one to a given situation, or both types of response may be aroused by the same situation. In such cases an emotion, perhaps of great intensity, would occur quite apart from any check to instinctive activity. An emotion is thus not due to the check but may be intensified by it. The visceral and glandular responses may be "replacement reflexes," but they may also be the primary responses to the situation.

If, for example, a situation calls for the double response escape-fear and the movements of escape are checked or inhibited, the visceral and glandular responses may be increased and the corresponding consciousness of fear may be thereby intensified. On the other hand, if the flight response is made, the fear may be actually diminished. This, however, does not always occur. The fear may persist at the same intensity or even increase, if the fear-

[5] James Drever, *Instinct in Man* (Cambridge University Press, 1921), p. 157.

producing situation remains the same or becomes intensified, as usually happens when one is chased by a vicious animal. Similarly, if a situation calls for the pugnacity-anger responses and the fistic or verbal reactions are inhibited, the anger responses may thus be intensified. But the anger may also be increased when fighting actually ensues, if the anger-producing stimulus is intensified. The tendency, however, would be for the anger to grow less, if the nervous energy is drained off in fighting responses.

It is possible that in certain cases a check to the overt response might be followed by a check or decrease to the emotion as well. It is not necessary that the nervous energy saved by the check must be drained into the autonomic apparatus. It might be used up in other skeletal responses or in intellectual activity; and the energy already flowing into the autonomic apparatus might change and follow the same course. For example, if there is a check to mating behavior, the accompanying emotion is just as likely to be diminished. The totality of the energy released by the situation may be used up in excessive physical activity or intellectual pursuits. On the other hand, a progressive attainment of the love-object or realization of the sex behavior is likely to be accompanied by an actual intensification of the correlated emotion, because the emotion-producing stimulus is progressively intensified.

Since the pugnacity-anger producing situation is itself usually some form of check to overt activity, the effect of such a check is often to tinge whatever emotion may already be present with anger. The theory that all emotions are due to checked activity seems to imply that the essential emotion is anger, as well as that all emotions are unpleasant. This is obviously not the case.

The view here expounded has certain implications for medical psychology, which can only be mentioned without elaboration. Whenever a situation demands overt response such as escape, fighting, or mating, and the required response is checked or inhibited, the visceral and glandular reactions may be intensified and prolonged. This places an undue and somewhat unnatural strain upon the autonomic apparatus. Such a strain if long continued may result in marked physical disturbances, gastro-intestinal and others. These disturbances are at first of the so-called functional variety, such as nervous indigestion; but it is well known that functional disorders of this kind may ultimately terminate in organic changes, such, for instance, as gastritis and gastric or intestinal ulcer.

Another result of this tension in the autonomic system is a fatigue and weakening of the whole apparatus. It is possible that various forms of visceroptoses have sometimes a so-called psychological origin. Such a consequence is, of course, more likely to occur in the case of those persons who by original nature or training have a pronounced tendency to inhibit overt expression in an instinct-emotion producing situation. The individual who expresses little may really feel most keenly, while he who expresses himself readily may feel less keenly and escape some of the unfortunate consequences of too intense emotion.

The primary emotions.—The primary emotions are the most elemental and universal emotions. They are thus the original or earliest acquired and therefore the most fundamental emotions. The primary emotions may be greatly modified in the course of development, and are frequently combined with other emotions and other men-

tal processes so that in adult life they may be scarcely recognizable. It seems probable that *excitement* should be classified under this heading. It is, as Stratton has pointed out, an undifferentiated emotion.[6] It involves a diffuse activity of the whole bodily mechanism, and its feeling tone may be either pleasant or unpleasant. It is probable that this is the original emotional response out of which the specific emotional patterns are later differentiated.

The primary emotions of *fear* and *anger* are more specific emotions but it has been shown that they are difficult to differentiate, apart from accompanying phenomena in consciousness and behavior. They are both emergency emotions and the autonomic responses in the two are similar. Fear is, however, more likely to be characterized by cold, weak, and sinking "feelings," and anger by hot, flushed, and tense "feelings." *Disgust* is closely allied to fear and anger, and these three emotions are usually unpleasant; but on occasion as a result of special experiences, they may have pleasant feeling tones.

The ego emotions of *elation* and *subjection* may also be regarded as primary emotions. The former has a highly pleasant feeling tone while the latter is ordinarily unpleasant. These emotions usually occur along with the corresponding ego instincts and are aroused by the same situations.

Other primary emotions are the *sex emotion* and the *parental emotion*. The sex emotion must be distinguished from the sentiment of sex love which will be described in Chapter XX, "Sentiment." The sex emotion must also be distinguished from the sex impulse or drive.

[6] G. M. Stratton, "Excitement as an Undifferentiated Emotion," in *Feelings and Emotions* (Clark University Press, 1928).

The former is the specific type of excitement or "thrill," often referable to cardiac tensions, which may accompany the sex impulse. The sex impulse and the sex emotion may, however, occur separately. In like manner the parental emotion must be distinguished on the one hand from the sentiment of parental love and on the other hand from the parental or protective impulse. It is the tender feeling which may accompany the parental impulse. McDougall regards "wonder" also as a primary emotion. This emotion is related to the instinct of curiosity. It is, however, somewhat questionable whether wonder and curiosity should be regarded as primary responses.

Relation of emotion to the autonomic functions.— Emotion viewed objectively is response chiefly of the autonomic apparatus. Cannon has shown that in anger there is hyperactivity of the sympathetic part of the autonomic system.[7] The heart beats more rapidly, the blood pressure increases, respiration is facilitated, digestive functions are inhibited, and so forth. As a part of this response the adrenal glands are stimulated, adrenalin is thrown into the blood stream and reinforces these same sympathetic functions. Cannon found precisely the same effects in fear, and concluded that the visceral responses of fear are identical with those of anger. Profuse sweating is, however, more likely to occur in fear than in anger, and there is also frequently a difference in the vascular responses. Pallor usually occurs in fear and flushing in anger, although sometimes a person becomes "pale with rage."

It seems probable that elation and the sex emotion are correlated with increased activity of the craniosacral por-

[7] W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear and Rage* (Appleton, 1920).

tion of the autonomic system. The sex emotion, particularly, involves responses opposite to those of fear and anger, and the former emotion is usually inhibited by either of the latter. The exact patterns of the visceral and glandular responses in the ego, sex, and other emotions have not been definitely determined. In fact, all emotional reaction patterns seem to differ considerably from person to person; and the experience of each individual is no doubt of paramount importance in determining the specific reaction patterns of his emotions.

Modification of emotions.—Emotions are very considerably modified as a result of experience. Indeed, the fundamental pattern reactions may themselves be early acquired rather than inherited integrations of the visceral responses. Be that as it may, the emotions are later modified just as instinctive responses are modified, both on the sensory side and on the motor side. The *sensory modification* is sometimes referred to as "conditioning of the emotional responses," because the emotions come to be aroused by objects and situations associated with the original stimulus. Watson has shown that a baby is originally afraid of loud sounds of low pitch but not of small animals. However, if a small animal, such as a kitten or a rat, is presented along with the sound, the fear response becomes connected with the substituted stimulus; and later the baby responds with fear when the animal is presented alone.[8] Perhaps many of the so-called "phobias" originate in this way through conditioning as a result of life's experiences.

Similarly, the anger response is connected through experience with various objects. A person thus learns what

[8] J. B. Watson and R. R. Raynor, "Conditioned Emotional Reactions," *Journal of Experimental Psychology*, 3 (1920), 1-14.

to be angry at. The same is true of the other emotional responses. Even the object which arouses the sex emotion is determined very largely through experience, perhaps the experience of earliest childhood. This accounts in part for the origin of sex fetishisms. There is likewise almost no limit to the number of objects or situations that may come to elicit the parental emotion. Emotions like feelings are not only transferred from one object to another but also tend to spread over the whole mental life. For example, anger may be aroused by some particular object, but it may persist and overshadow all the activities of the day. Other emotions spread in like manner. Thus it may be true that "the whole world loves a lover," but it is equally true that a lover loves the whole world.

The *emotional responses* also undergo continuous modification throughout the life of the individual. The importance of this fact is emphasized by Dashiell. He says:

> We may entertain the possibility that there are no *native* patterns of visceral reactions at all, but that the patterning that is to be later discovered in particular individuals is traceable to their experience, is acquired. Given at birth a repertoire of visceral reaction-elements, these may come to be integrated in the course of the individual's development.
>
> But note that the environment directly controls much overt behavior and can ordinarily exert but *indirect* influence upon visceral reactions. In consequence, while we may expect to find some uniformity of gestural, facial, and other forms of expression in different individuals, and may further expect early habituation to the conventional social usage in the applying of names thereto, still we need not expect to find much uniformity between individuals in the patterning of the visceral reactions acquired.
>
> When two people manifest very similar behavior as respects attitudes set up toward their environment, the visceral segments of the behavior may show entirely different configurations.

At the expense of over-simplifying, let me make the point clearer with a concrete example. When two different individuals attack, the overt behavior of the one may be supported by increase in the tonicity of one part of the alimentary canal, that of the other by increase in tonicity of another part; the behavior of the former may be facilitated by more rapid breathing or a changed distribution of blood, that of the latter by accelerated pulse and by increase of adrenal secretion.

On this conception, then, man is not born with definite patternings of his visceral responses worthy of being called distinct emotions. The most that he has in this direction are certain tissues, organs, and organ-systems (respiratory, circulatory, heat-regulating, etc.) capable of interacting and mutually influencing in complicated ways, and the rates, amounts, and orders in which these organs and systems severally participate in the overt behavior of a man toward his environment are not predetermined in any highly definite way.[9]

Dashiell thus takes the extreme view that all emotional patterns are acquired. It is, however, possible to take the view that some of these patterns may be inherited, but that in any case they undergo a very great modification as a result of experience.

Emotions also become organized in various ways and associated with other mental processes, such as instinctive impulses, feelings, and ideas. They combine with each other to form *compound emotions*. For example, loathing is a combination of fear and disgust. Awe is said to be a combination of fear and wonder. Jealousy is analyzable into anger and self-love. Similarly anger and elation may occur together in some forms of aggressive behavior, and there are other combinations of emotion which have no special names.

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[9] J. F. Dashiell, "Are There Any Native Emotions?" *Psychological Review*, 35 (1928), 319-327. Quoted by permission.

Emotions are also associated with feelings. Fear, anger, disgust, and subjection are usually unpleasant emotions; while elation, sex, and parental emotions are usually pleasant. The emotions may, however, become associated with other feelings. Fear may actually be combined with pleasantness, as the fear in reading a thrilling novel. R. L. Stevenson in a story called "The Suicide Club" presents an interesting example of the pleasure of "trifling with fear." In this story the members of the club draw cards to determine who will be the victim of the day and seem to enjoy the experience. Anger also is frequently pleasant, as in righteous indignation. On the other hand, elation, the sex emotion, or the parental emotion may be unpleasant as a result of the association of these emotions with unpleasant situations or experiences.

Emotions are also combined with impulses and ideas to produce sentiments. The development and organization of the sentiments will be discussed in a succeeding chapter. In general, the result of modification of emotions is to produce the so-called secondary or finer emotions. Some of these secondary emotions have already been mentioned. The finer emotions also involve some inhibition or decrease of the intensity of the emotional response. In this way are developed the numerous subtle nuances of emotion that are to be found in highly developed and cultured persons.

Repression of emotions.—Emotions, like instincts, may be repressed or inhibited. This may occur if they come into conflict with a person's ideals and standards of conduct. There may be a complete inhibition involving both the emotional consciousness and the response. More interesting, however, are the cases in which the autonomic responses still occur but the characteristic emotional ex-

citement is not experienced in consciousness. In such cases the emotional responses may be fairly obvious to any external observer, but the subjects deny that they feel any emotion. For example, there may be indications of characteristic sympathetic activity such as "cold sweat," pallor, and restlessness, while the subject feels no fear. It is possible that cold sweating, which occurs so frequently in otherwise normal persons, is sometimes an unconscious fear response. Similarly it is possible to have the visceral responses of anger or other emotions without the usual accompanying consciousness.

The neurological explanation of this phenomenon offers some difficulties, but it is probable that the afferent nerve currents involved in emotion are relayed through lower brain centers. In other words, there is a functional dissociation involving the higher nerve pathways concerned in the emotional consciousness.

ABNORMALITIES OF EMOTION

The abnormalities of emotion may be either quantitative or qualitative. In the former case, the emotions are either unusually intense or unusually weak. In other words, the subject is either oversensitive or very blunt emotionally. Such variations in degree may affect the whole emotional life, or may pertain to only one of the emotions such as anger, fear, or elation. For example, a person may be extremely liable to outbursts of anger without any corresponding intensity of the other emotions; or he may experience practically no anger without any corresponding diminution of the intensity of the other emotions.

The qualitative abnormalities are of two chief varieties. An emotion may be aroused in an unusual situation as in

the case of the phobias described below; or the emotional response may assume an unusual form as in the case of "temper tantrums." These two types of abnormalities may be found in any of the emotions. Some of the more common abnormalities of fear and anger will be described in greater detail, but it is well to remember that similar abnormalities occur in the other emotions. The ego, sex, and parental emotions may be aroused by unusual objects and may express themselves in unusual responses, just as in the case of the corresponding instincts.

Emotional instability.—This is a much discussed emotional abnormality which involves the emotional life in general. It is characterized by extreme variability of emotions and feelings. Emotions are easily aroused and just as easily disappear. Hence the subject may pass rapidly from one emotion to another. This anomaly is probably due in part to excessive emotional sensitivity, and in part to inability to control the emotions. The customary inhibiting habits have not been developed or have been broken down under stress. Emotional instability is a characteristic of childhood, and better affective equilibrium is usually established as the emotions become organized and controlled in the course of development. Emotional instability is thus sometimes called "emotional infantilism." Its occurrence in adults represents a failure in affective development, or a regression due to temporary loss of emotional control.

Somewhat allied to emotional instability are the abnormalities that may result from emotional repression and inhibition, previously described. Such repression may be due to the unbearable intensity of the emotional response, and is thus an attempt to solve a difficult emotional problem. Repression may result in a superficial appearance of

emotional bluntness, whereas the subject is really protecting himself against an extreme emotional sensitivity. The alternative to feeling too intensely is not to feel at all. Sometimes, as previously pointed out, only the conscious aspect of the emotion is repressed while the visceral and glandular responses take place as usual. In such cases an external observer recognizes the emotion better than the subject himself. Repressed emotions may express themselves in unusual forms, and on occasion may burst forth all the more violently because they have been temporarily inhibited or held in check.

Abnormalities of fear.—The abnormal fears are characterized by their intense and irrepressible but unreasonable nature. They may be general or specific in their reference. General fear is sometimes called "panophobia," it is fear without any particular object as in apprehensive and anxious states. Fear of this sort is called by Freud a "floating affect," since it appears to float in consciousness without any particular point of attachment. Such general fear may later become attached to a particular object or idea, and then it becomes a specific fear.

The specific fears are usually called *phobias*. Such fears may pertain to almost any object or situation, but certain phobias are relatively common. A few of these are mentioned by way of illustration. Acrophobia is fear of high places like tops of buildings or cliffs. Agoraphobia is fear of open spaces, for instance, fear of crossing streets or open parks. Claustrophobia is fear of being in a closed space, such as a small room with the door closed. Misophobia is fear of dirt or contamination. This phobia may really be abnormal disgust rather than fear. The afflicted subject may spend a great part of his time washing his hands or trying in various ways to keep clean.

Some other relatively common phobias are: fear of blushing, fear of blood, fear of solitude, fear of anything new and unfamiliar, fear of crowds, fear of having committed an unpardonable sin, and even fear of being afraid. In fact, fears may become attached to almost any conceivable object.

Various attempts have been made to explain these abnormal fears. Freud believes that all phobias begin as panophobias, and that their attachment to specific objects is secondary.[10] This panophobia is an overcompensation or defense against a repressed sexual wish or impulse. In other words, the subject fears what he most desires. When this compensating fear becomes attached to some specific object, the object thus selected has also a relation to the repressed desire. It symbolizes or represents the object of desire, because it has in some way become associated with that object. Thus fear of snakes may represent sexual desire because a snake is supposed to be a phallic symbol. It is possible that Freud's account may explain some phobias, but there are others that cannot be readily accounted for in this way.

The behaviorists regard a phobia as a conditioned response. It is a fear response elicited by an inappropriate stimulus which has become substituted for the original fear stimulus, because in some previous vivid experience the two stimuli occurred together. It has previously been pointed out that this form of transfer of any emotion is a frequent occurrence in everyday life; and no doubt many of the common phobias may be thus explained.

Janet regards all phobias as fundamentally "fear of

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[10] Sigmund Freud, *Introductory Lectures on Psychoanalysis*, translated by Joan Rivière (Allen & Unwin, 1922), pp. 328-343.

action." [11] The fear occurs when the resources of the mind are depleted, and the energy at the disposal of the subject is insufficient to attain the higher reflective form of behavior which he seeks to achieve. The fear arises in order to avoid a lower form of behavior on the one hand, or failure on the other. From this point of view the fear is really fear of failure, fear of being unable to attain a high standard of conduct. In other words, the fear is secondary to the ego instincts. It arises when the wish for superiority and success seems unlikely to be realized. This theory affords a plausible explanation for phobias pertaining to social and occupational situations.

Prince has contributed greatly to the understanding of the phobias.[12] His analysis has shown that a phobia is not so irrational as it seems. It only seems irrational because certain features of the total mental picture are subconscious. The fear bears a logical relation to this subconscious complex. A total fear response and situation includes the physical disturbance, the emotional consciousness, the idea or object of the emotion, and the meaning of this idea. Any number of these factors may be outside of consciousness. Sometimes there remains in consciousness only an awareness of the physical reactions without any feeling of fear whatsoever.

In general fear or anxiety, the physical disturbance and the emotion are both conscious, but the idea and meaning are functioning subconsciously. Consequently the subject does not know what he is afraid of. In specific phobias the idea also is conscious while its meaning or setting remains subconscious. The subject then knows what he

[11] Pierre Janet, "The Fear of Action," *Journal of Abnormal Psychology*, 16 (1921), 150-160.

[12] Morton Prince, *The Unconscious*, pp. 363-422.

is afraid of, but does not know why he is afraid. Finally, the meaning may also be in consciousness. The subject then knows not only what he is afraid of but why he is afraid. The first step in the removal of a phobia is to bring into consciousness the various unconscious factors. The second step is a matter of reëducation, the development of a different emotional reaction to the situation.

These different theories of phobias are not mutually exclusive. They probably represent different aspects of the truth. Prince's analysis is compatible with any of the other accounts of the origin of the phobias. These other accounts are probably true accounts for different phobias, for it is not necessary that all phobias should be explained in the same way.

Abnormalities of anger.—Abnormal anger may also be general or specific in nature. General anger is a continuous irritability, annoyance, or irascibility with no particular object. This abnormality occurs frequently in everyday life. Almost any person may have days during which he has such feelings of annoyance without being able to assign any definite cause for the condition. Moreover, some otherwise normal persons are chronically quarrelsome, and this condition is also frequently found in certain mental diseases such as chronic alcoholism.

In the specific abnormalities of anger, the emotion is aroused by some definite object or situation. Either this situation is an unusual one, or the anger response takes an abnormal form. Anger responses to unusual situations are of frequent occurrence, but they have not been specially named and described as in the case of the phobias. Abnormal anger responses may be illustrated by the so-called "temper tantrums." These are violent outbursts of anger aroused by some person or event. They

often occur in childhood and are normally outgrown, unless certain factors in the home or school situation tend to make them habitual. If such outbursts of temper are in any way satisfying to the child, they are likely to become habitual; and they will be satisfying, if they assist the child in attaining his desires and in securing an unusual amount of attention.

Another abnormal anger response is the development of an attitude of annoyance and suspicion directed against one or more persons. This annoyance may not be fully conscious but it nevertheless influences the attitudes and behavior of the subject. It may sometimes be described as a "get-even complex," because the subject is always trying consciously or unconsciously to square accounts with some one. Anger, as previously shown, reinforces the pugnacious drive; and if the conscious aspect of the anger is itself repressed, the physical component may still have this reinforcing effect. Hence repressed anger may break forth in a violent attack upon some person. Such acts of malicious revenge sometimes occur in daily life, and are particularly common in persons suffering from paranoiac delusions.

In the explanation of abnormal anger, a number of factors must be taken into account. First, there is the possibility of the inheritance of violent temper. This has been emphasized by Davenport, who made a study of the family histories of a number of persons subject to extreme anger responses.[13] The results are, however, not conclusive; and even if heredity accounts in part for abnormal anger, other factors are also of great importance. One of these factors is overindulgence in childhood. If satis-

[13] C. B. Davenport, "Violent Temper and Its Inheritance," *Journal of Nervous and Mental Diseases*, 42 (1915), 593-628.

faction is always obtained by outbursts of temper, this type of behavior will become habitual. Another factor is the continual thwarting of the child's interests, instincts, and activities. Teasing, bullying, criticizing and punishing interfere greatly with normal emotional development. They may result in a "get-even complex," a strong tendency to square accounts at some future date. Such an attitude may persist throughout life, or the repressed desire for revenge may burst forth on some special occasion in acts of violence.

In the case of anger there may be the same relation of the abnormal manifestation to a subconscious complex as in the case of fear. Prince's analysis of phobias may also be applied to abnormal anger and other emotions. The physical reactions alone may be conscious while the anger remains unconscious or repressed. Again both the physiological disturbances and the emotion may be conscious, while the object of anger and its meaning are subconscious as in general irritability. In other cases the specific object which tends to arouse anger without any obvious cause is also conscious, while the meaning or general setting which would adequately account for the anger is outside of consciousness. Such specific angers correspond to the phobias previously described.

The abnormalities of the other emotions are similar to those of fear and anger, and may be explained in accordance with the same principles. They are probably not of such great importance to the person concerned or to society in general. Consequently, they are rarely described and studied, and much less is known about them.

CHAPTER XII

HABIT AND LEARNING

Habit is acquired mode of response or pattern reaction, and makes up the largest part of human behavior. Its importance is very well expressed in the following passage from James's *Psychology:*

Habit is thus the enormous fly-wheel of society, its most precious conservative agent. It alone is what keeps us all within the bounds of ordinance, and saves the children of fortune from the envious uprisings of the poor. It alone prevents the hardest and most repulsive walks of life from being deserted by those brought up to tread therein. It keeps the fisherman and the deck-hand at sea through the winter; it holds the miner in his darkness, and nails the countryman to his log-cabin and his lonely farm through all the months of snow; it protects us from invasion by the natives of the desert and the frozen zone. It dooms us all to fight out the battle of life upon the lines of our nurture or our early choice, and to make the best of a pursuit that disagrees, because there is no other for which we are fitted, and it is too late to begin again. It keeps different social strata from mixing. Already at the age of twenty-five you see the professional mannerism settling down on the young commercial traveller, on the young doctor, on the young minister, on the young counsellor-at-law. You see the little lines of cleavage running through the character, the tricks of thought, the prejudices, the ways of the "shop," in a word, from which the man can by-and-by no more escape than his coat-sleeve can suddenly fall into a new set of folds. . . .

If the period between twenty and thirty is the critical one in the formation of intellectual and professional habits, the period below twenty is more important still for the fixing of

personal habits, properly so called, such as vocalization and pronunciation, gesture, motion, and address. Hardly ever is a language learned after twenty spoken without a foreign accent; hardly ever can a youth transferred to the society of his betters unlearn the nasality and other vices of speech bred in him by the associations of his growing years. Hardly ever, indeed, no matter how much money there be in his pocket, can he even learn to *dress* like a gentleman-born. The merchants offer their wares as eagerly to him as to the veriest "swell," but he simply *cannot* buy the right things. An invisible law, as strong as gravitation, keeps him within his orbit, arrayed this year as he was the last; and how his better-clad acquaintances contrive to get the things they wear will be for him a mystery till his dying day.

The great thing, then, in all education, is to *make our nervous system our ally instead of our enemy.* It is to fund and capitalize our acquisitions, and live at ease upon the interest of the fund. *For this we must make automatic and habitual, as early as possible, as many useful actions as we can,* and guard against the growing into ways that are likely to be disadvantageous to us, as we should guard against the plague. The more of the details of our daily life we can hand over to the effortless custody of automatism, the more our higher powers of mind will be set free for their own proper work. There is no more miserable human being than one in whom nothing is habitual but indecision, and for whom the lighting of every cigar, the drinking of every cup, the time of rising and going to bed every day, and the beginning of every bit of work, are subjects of express volitional deliberation. Full half the time of such a man goes to the deciding, or regretting, of matters which ought to be so ingrained in him as practically not to exist for his consciousness at all. If there be such daily duties not yet ingrained in any one of my readers, let him begin this very hour to set the matter right.[1]

The nature of habit.—Habit is a result of association. It is due to the acquisition of bonds or connections as

[1] William James, *Psychology, Briefer Course* (Holt, 1907), 143-145. Quoted by permission.

the result of experience. From the objective point of view habit may take two forms. First, it may be conditioned response analogous to the "conditioned reflex." This is the association of movement with the perception of an object. The second form of habit is coördination of responses. This is the association of different movements into new combinations and sequences. The habits first formed are coördinations of random movements and reflex actions, while the later habits are more complex coördinations of these original movements and of habits previously acquired. From the subjective point of view, habits like instincts are impulses. They are either impulses conditioned to new situations, or associations of simple impulses into new combinations. The formation of habit is thus the organization of impulses into systems or hierarchies. Simple impulses are combined into more complex ones, and the latter are further combined into still more complex major drives.

The neurology of habit is merely the formation of new neural connections in conformity with the law of association, namely: "When two or more neural systems are active at the same time, the resistance of the synapses between the systems is lowered so that later activity in one system may spread to the other." The term "habit" is usually used for connections of this sort involving the motor neurons. The efferent neurons become associated with afferent, internuncial, or other efferent neurons as a result of experience. The motor areas immediately in front of the fissure of Rolando may be regarded as motor emissive areas (see Fig. 13). The connections between these areas and the motor neurons at lower levels are probably due to original nature, while the connections among neurons within the motor areas and of

these neurons with other cortical neurons are mainly due to experience.

Neural connections due to experience are called associations, and associations among motor neurons are acquired coördinations. Motor coördination is based upon decreased synaptic resistance; and it is, in part, a function of neurons in the frontal lobes immediately in front of the motor emissive areas. These neurons become functionally interpolated between the motor-emissive cells, and thus synchronize the efferent currents. The cortical areas in front of and adjacent to the motor areas proper may therefore be regarded as centers for motor habit formation. The centers for the formation of the specific habits are not, however, absolutely localized. If the cells which function in the coördination of any specific habit are destroyed, other cells may perform a similar function and the lost coördination may in this manner be regained. Neurologically the formation of motor habits is thus the formation of new neural patterns which coördinate efferent nerve currents; and habit as conditioned response is the formation of connections between sensory and motor neural patterns.

THE FORMATION AND FIXATION OF HABITS

Some examples.—The process of habit formation may be illustrated by a few examples. Thorndike has described the behavior of a kitten learning to open a box by pressing on a lever. The box is made of laths with open spaces between them, and the door is attached to a spring which pulls it open if the lever on the inside is pressed down. Food is placed outside the box. The behavior of a kitten put into this box is described as follows:

It tries to squeeze through between the bars, claws at the bars and at loose things in and out of the box, stretches its paws out between the bars, and bites at its confining walls. Some one of all these promiscuous clawings, squeezings, and bitings turns round the wooden button, and the kitten gains freedom and food. By repeating the experience again and again, the animal gradually comes to omit all the useless clawings, and the like, and to manifest only the particular impulse (*e.g.*, to claw hard at the top of the button with the paw, or to push against one side of it with the nose) which has resulted successfully. It turns the button around without delay whenever put in the box. It has formed an association between the situation, *confinement in a box of a certain appearance,* and the response of *clawing at a certain part of that box in a certain definite way.* Popularly speaking it has learned to open a door by turning a button.[2]

Another illustration of habit formation is that of a rat learning to find its way through a maze. The maze has many blind alleys and the rat must learn to eliminate these alleys and go directly from the starting point by the shortest route to its food. In one experiment the average time required by twenty-seven rats for the first performance was 467 seconds, and the average distance they traveled was 4,216 centimeters. Both the time and distance were gradually cut down in successive trials until on the thirty-first trial the time was only 31.8 seconds, and the distance traveled 593 centimeters. The progress of the learning is given in greater detail in Table II.

Habit formation may also be illustrated by many activities of the growing child, such as learning to lace shoes, to button clothes, to use a spoon, and later to use a knife and fork. The process of learning to write and

[2] E. L. Thorndike, *Educational Psychology, Briefer Course* (Columbia University Press, 1917), p. 129.

TABLE II

HABIT FORMATION IN THE RAT

Average attainment of twenty-seven white rats in maze experiment. Two trials each day; animal allowed to feed after second trial. (From Warren, after Hubbert, *Journal of Animal Behavior,* 1914, 4, 63.)

Trial	*Average Time (seconds)*	*Average Distance (centimeters)*
1	467.0	4216.1
6	186.6	1719.2
11	40.3	1029.8
16	25.5	868.4
21	24.2	739.9
26	26.1	756.5
31	31.8	593.2

TABLE III

HABIT FORMATION IN MAN

Average attainment of four human subjects learning to typewrite nonsense groupings of seven different letters, arranged in a series of fifty-five letters. The series was performed three times daily. Table shows average time and average number of errors per series. (From Warren, after Bair, *Psychological Monographs,* No. 19, p. 17.)

Day	*Average Time (seconds)*	*Average Number of Errors*
1	79	29
2	72	27
3	63	14
4	60	10
5	56	7
6	54	4
7	53	2.5
8	49	2
9	47	0.25

to speak will be described in the following chapter. An interesting example of habit formation that has been studied experimentally is learning to typewrite. The process is quite analogous to the learning of animals

already described. At first the performance requires a great deal of time, and many errors are made, but both time and errors are progressively reduced with practice.

Table III shows the actual results obtained in an experiment on learning to typewrite. The subjects wrote a series of 55 letters in nonsense groupings. The average time for the first trial was 79 seconds, and the average number of errors was 29. By the ninth day the average time was 47 seconds, and the average number of errors less than one. Such examples illustrate certain stages and factors in the process of habit formation or learning. These factors are further described below.

Random trials and chance success.—The process of habit formation begins with more or less random movements or trials. The kitten scratches about the box in a random way; the rat runs about the maze in a random way; and even the human subject learning to typewrite at first makes many random trials. An adult human subject has, however, the advantage of many previously acquired habits. Any organism faced with a new problem or situation goes through a repertory of movements. Some of these movements are original random responses, as in the case of the kitten in the box; while others may be previously acquired habits, as in the case of a human subject learning to typewrite. Some one of this repertory of movements meets by chance with success, and this is the first step in the formation of a habit.

This stage in learning may likewise be illustrated by a person solving a mechanical puzzle, such as separating a number of rings. The person goes through his repertory of movements, and suddenly by chance the thing falls apart. On the first success he usually does not know how it happened. It is, moreover, difficult for him to learn

how to solve such a problem by imitating some other person's performance. He learns best by doing it himself. The performance of another person may, however, establish a standard for achievement, and in this way assist in the learning process. This problem of imitation will be discussed in a succeeding chapter. The method of random trials and chance success is sometimes called "the trial and error method" of learning. It is the method always used in the formation of the first habits. In later learning some of the random trials may be performed only in imagination.

Repetition aids fixation of habit.—A second factor in establishing a habit is repetition. The above examples show a continual decrease in time and in the number of superfluous movements or errors as the experiment is repeated. In other words, repetition increases both speed and accuracy. It is important in this connection to emphasize the fact that there is a *negative factor* in learning. This is shown in the elimination of superfluous movements. In acquiring acts of skill many such movements are eliminated without any attention being given to the matter. But it has been found that in highly skilled performances some useless movements may still remain. These also may be eliminated following an analytical study of the movements involved in the habit. Gilbreth has studied the movements in industrial occupations, and has shown that the efficiency of a worker can be increased by training him in new methods of work in which all movements that are not necessary to the task are eliminated.[3] This "motion study" has made an important contribution to industrial efficiency. A negative factor is also

[3] F. G. Gilbreth, *Motion Study* (Van Nostrand, 1911).

found in ideational learning. For example, in memorizing a poem it is necessary not only to form a correct association of successive ideas but also to inhibit other irrelevant ideas.

Pleasant results aid fixation of habit.—In the illustrations of animal learning the animals were fed on successfully completing the task. Experiments have shown that learning is more rapid under these conditions, and also that it is still more rapid when there is both reward for the successful response and some form of mild punishment for unsuccessful responses. For example, a rat will learn the maze more quickly if it receives a mild electric shock every time it enters a blind alley, as well as food when it reaches the end of the maze. The principle of rewarding the successful or desirable behavior and punishing the undesirable has always been used by animal trainers.

Any sort of pleasant or satisfying results will help in the fixation of habit. Other satisfying results in the case of human subjects are: approval of others or self, achieving power or domination, securing attention, and gratifying any other major drive. Many undesirable habits are acquired by children, because these actions invariably secure the attention of parents, teachers, or other children. A child's habit of crying for what he wants, of fussing about his food, or of disturbing the schoolroom, may be established in this way. Such behavior must be made less satisfying to the child if it is to be eliminated. The effect of feeling upon habit formation may be understood neurologically in terms of the facilitation and inhibition of neural processes; for, as previously suggested, pleasantness and unpleasantness are themselves the conscious aspects of neural facilitation and inhibition.

The distribution of trials in learning.—It has been found in the training of animals that fewer trials are necessary to establish a habit if they are separated by an interval of time than if they follow one another immediately. Similarly, human subjects require fewer repetitions to memorize a passage of prose or poetry if the repetitions are distributed than if they are all massed together. The amount of time that should separate the trials for the most economical learning has not been definitely determined. It probably varies with different subjects and under different conditions. Only relatively short time intervals have been studied. The results seem to indicate that, within the range of a day or two, the longer the interval between repetitions the fewer the repetitions necessary for complete learning.

If the trials are distributed, the learning will, of course, spread over a longer period of time. When it is necessary to learn a task quickly, long intervals between repetitions obviously cannot be used. A short interval is, however, better than none. Such an interval probably gives the newly formed neural connections time to become partly fixed before the next repetition. Hence the subject gets the full advantage of the learning in each trial. The task is thus learned with fewer trials, and it is also better retained.

Learning by wholes.—A task may be learned all at once, or part by part. A rat may be given a part of the maze to learn at one time and then another part, or it may be given the whole maze to learn at once. It has been found that the latter is the more efficient method. In the former case, after learning each part, the animal must next learn the connections between the parts. This is a less economical method than learning all the connections

in the same trial. Similarly, a human subject may learn a poem stanza by stanza, or he may read it from beginning to end on each trial. The latter has also been found the more economical method. In other words, learning by wholes is more efficient than learning by parts.

This principle has, however, obvious limitations. In a very long and complicated task, it is probably better to subdivide it for learning. For example, in attempting to memorize Tennyson's "In Memoriam" it would probably be better to learn one section at a time than to read and reread the whole poem from beginning to end. But it would be better to learn a section as a whole than to learn one stanza at a time. In learning a scientific subject such as psychology it is desirable at first to read the text rapidly to the end in order to get a comprehensive grasp of the subject and its organization, and then to study the special topics separately for details.

The motivation of learning.—Learning is more rapid and effective if a person wishes to learn and is interested in the subject. To go automatically through a task with no interest in the performance has very little effect in adding to one's knowledge or skill. In other words, there must be a motive for learning. The pleasant results mentioned above may be regarded as motives, and there are also other motives, such as the desire for efficiency, fame, or economic success. It is an important task of the educator to attempt to connect the learning process with certain fundamental instinctive or habitual drives or interests. Competition is a motive frequently and successfully used in schools. When ordinary competition is not possible, its absence may be compensated for by getting the pupil to compete with himself in the attempt to beat his own previous record. If a pupil keeps a record of his

performance in any task from day to day, it provides a decided incentive for improvement.

On the other hand, aversion and prejudice may be very effective in preventing learning. A person cannot become proficient in an action or in behavior that he finds unpleasant. He cannot readily acquire skill in games, in professional technique, or in social conduct, if he has a prejudice against such skills. He cannot easily learn a foreign language, if he has an aversion to the language or to the people who speak it. Similarly, he can with difficulty acquire knowledge in a special field, if he dislikes the subject or the teacher. It is obviously important in education to prevent as far as possible the development of such handicapping dislikes and aversions.

The habit of forming new habits.—It is easy to get into a rut, to become fossilized. This can be avoided only by keeping the mind open to new ideas, and by being always ready to adopt new modes of behavior. In other words, learning is facilitated by acquiring the habit of forming new habits. A similar idea is expressed by James in the following words: "*Keep the faculty of effort alive in you by a little gratuitous exercise every day.* That is be systematically ascetic or heroic in little unnecessary points, do every day or two something for no other reason than that you would rather not do it, so that when the hour of dire need draws nigh, it may find you not unnerved and untrained to stand the test." [4]

The curve of learning.—The process of learning is frequently illustrated by means of a diagram called "the curve of learning." Figure 19 represents such a curve for telegraphy. The ordinate represents the number of

[4] William James, *op. cit.*, p. 149.

words telegraphed in five minutes, and the abscissa, the number of successive days of practice. This curve is rather typical of the learning process. A learning curve rises at first rapidly, and then more and more slowly with successive trials. In other words, a proportionately larger amount is learned in the earlier than in the later trials.

A learning curve does not rise smoothly or continuously from trial to trial. There are *irregularities* in the curve. The general trend of the curve is upwards, but the performances in some trials are poorer than in the preceding ones. These irregularities are due to various factors. The physiological condition of the subject varies from day to day. He has his good days and bad days. Sometimes he is more fatigued than others. His mental condition also varies. He may be depressed or elated, he may be interested in the task or preoccupied with something else. The environmental conditions such as the weather and the laboratory surroundings likewise vary. All these factors play their part in causing irregularities in the curve.

Plateaus may also be found in the learning curve. A plateau represents a considerable period of time during which no improvement in performance is evident. In the curve for telegraphy in Figure 19 there is a plateau from the twentieth to the thirtieth day, followed by a relatively rapid rise in performance during the succeeding days. Such plateaus are due to a number of causes. There may be loss of interest or incentive during the period in question. Perhaps the subject is satisfied with his performance and has no motive for achieving better results. In this case, an increase in salary, or the discovery of another person's higher standard may effect an increase in output or skill. It is also possible that during the plateau period the learning process was actually going

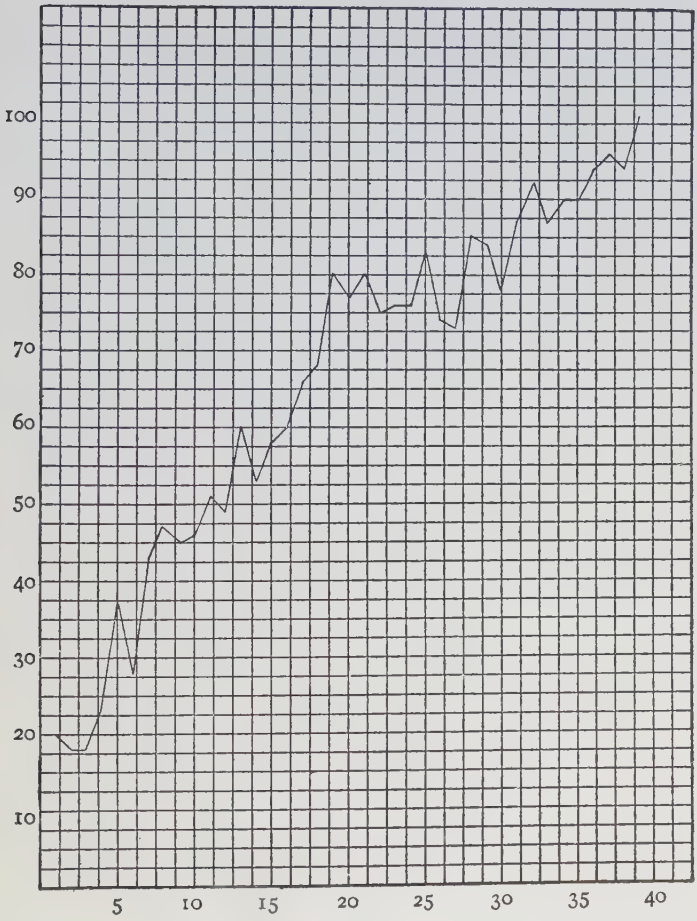

FIG. 19. "LEARNING CURVE" FOR TELEGRAPHY

The vertical axis represents the number of words the learner could telegraph in five minutes. The horizontal axis represents the number of successive days of practice. (From Swift, *Psychological Bulletin*, VII, 150.)

on and new neural connections were being made which were not manifested in increased achievement. Perhaps a number of neural connections had to be made before the

improvement could be overtly expressed. In this case achievement would be suddenly augmented when the last connection was made. In certain performances, such as telegraphy, it has been found that a person may remain on a plateau for years, and then rapidly rise to a new level of achievement.

The elimination of habit.—The process of the elimination of habits will be more or less obvious from the foregoing account of their formation and fixation. In the first place, eliminating an old habit is primarily a matter of forming new ones. An old habit cannot very well be thrown off without a substitute, for the situation usually demands or initiates some response. Habits of an opposite or different kind must be established. In the formation of these new habits the old ones are likely to disappear. The new habits are formed in accordance with the principles already discussed. The old habits atrophy from disuse just as the new habits are stamped in by repetition. Another important principle in the elimination of habits is to make them less satisfying to the individual concerned. Unpleasant or annoying results will usually remove habits, just as pleasant and satisfying results establish them. That is to say, there must be a motive for the elimination of a habit.

KINDS OF HABIT

Habits are all fundamentally the same in origin, but they may be classified for practical convenience into a number of different groups. The term "habit" indicates primarily a learned form of behavior, though it is sometimes used in a broader sense to include other forms of learning as well. For example, it is common to speak of "habits of thought." Ideas and modes of thinking are

learned. The mode of thought differs greatly among different individuals, and may be entirely changed by training in logic or mathematics. Perception also is largely a result of learning, and its origin may be indicated by the phrase "habits of perception." It would seem advisable, however, to reserve the term "habit" for acquisitions on the motor side. In this case ideational and sensory learning would not be included, except in so far as they involve impulses and reaction patterns.

Habits of skill.—The habits described in the illustrations of habit formation may be called habits of skill. These are the typical habits, and are the most easily studied experimentally. Our knowledge of the process of habit formation is derived chiefly from a study of habits of skill. They include skills in games such as tennis or billiards, and skills in work or "trade skills." Thus, many forms of activity may be classified as skills. They embrace not only skills in the well-known trades but also such habits as sewing, knitting, painting, playing musical instruments, and performing surgical operations. Habits of skill likewise include writing and speech habits, which are described in the following chapter.

Personal habits.—All habits are personal in the sense that they belong to a person and constitute part of his individual equipment. In a narrower sense, some habits that have a minimum of social importance are frequently described as personal habits. Here are included such forms of behavior as feeding habits and habits of elimination. The time and frequency of eating and what one eats are matters of habit, as are also the time and frequency of going to the toilet. Habits of sleep are likewise personal habits. These include the time of going to bed and getting up, and the amount and frequency of sleep.

Personal habits are usually taken to include sex habits, habits of cleanliness, and drug habits. These have, however, a still more obvious social significance.

Social habits.—Social habits are those forms of behavior which are acquired and performed in relation to other persons. They include social habits in the narrow sense, that is, social etiquette and manners; but they also include habits in business relationships and so-called moral habits. The latter are social habits which may be regarded as good or bad, desirable or undesirable. Moral habits therefore include such behavior as obedience or disobedience, truthfulness or untruthfulness, punctuality or tardiness, extravagance or thriftiness, generosity or stinginess, carefulness or carelessness, and so forth. All these habits are learned in the same way and in accordance with the same principles as the habits of skill described above.

Affective habits.—In the chapters on "Feeling" and "Emotion" it was pointed out that affective responses are modifiable, and may be attached to various objects as a result of experience. In other words, we learn our likes and dislikes, our fears, what to be angry at, and what to love. Illustrations of this form of learning were given in that connection and need not be repeated here. It is well, however, to emphasize that our feelingful and emotional responses in everyday life are very largely a product of past experience. They are habits which were formed like other habits, and which can be eliminated also like them. In other words, the formation of affective habits depends upon affective learning capacity and upon environmental influences, guidance, and training. Such habits may be acquired under controlled conditions, just as habits of skill are acquired.

Habits of control.—From the subjective point of view, habits are experienced as impulses. These are not, however, the only impulses. Reflex and instinctive impulses have already been discussed. A habit impulse probably originates through the organization of simpler and more fundamental impulses, but the organized impulse is then experienced as a new drive. Habits of control are habits of checking or inhibiting impulses, both habitual and instinctive. Habits of control are acquired in the same way as other habits. They are probably at first more or less chance responses that become stamped in by repetition and by their satisfying results. In this way a child learns not to take the candy or fruit that belongs to some one else. He finds the control of this primary impulse more satisfying; for by means of it he wins approval and avoids punishment. In the same way he may learn not to fight or not to show off.

These habits of control are learned separately for each specific impulse. There is no such thing as a general habit of control that can be learned all at once. Some persons may, of course, have learned to control all the important impulses, but in this case the learning has been a separate process for each impulse. On the other hand, many persons have developed habits of control over some of the drives and not over others. Pugnacity may be controlled but not the sex impulse, the sex impulse may be controlled but not the ego, and so forth.

It seems probable that individual differences are just as often due to the distribution and strength of the habits of control as to the number and strength of the impulses. A person who fights readily may be one who has a great deal of the pugnacious impulse, or one who has not acquired a habit of controlling this impulse. Some so-called

sex differences may be dependent upon the habits of control acquired by the different sexes. For example, a boy must learn to control fear but not necessarily pugnacity, while a girl must learn to control pugnacity but not necessarily fear. Similarly, in the present social organization it is more important for a girl than for a boy to acquire habits of control of the sex impulse. A girl, on the other hand, has more freedom in expressing self-display.

Even some of the differences between races may be due to different habits of control which they have acquired because of their different social traditions. For example, a Scotsman must learn to control his impulses of affection, but he need not to the same extent control his pugnacity or his acquisitive tendencies. On the other hand, a Frenchman need not control his impulses of affection but he must learn to control his anger and aggressiveness on social occasions. A Frenchman must be polite and deferential above everything else.

Rational and voluntary action.—Rational action is either a new combination of previously acquired habits with reference to a novel situation, or action in conformity with a plan. Action in conformity with a plan means action that has been verbally rehearsed, or rehearsed in the imagination. Thorndike's cat in the box went through a series of random movements one of which finally met with success. A human subject in a similar situation would have performed many of these trial movements only in imagination. This is the fundamental difference between the "trial and error" method and the rational method of solving a problem. Reasoning will be further described in a subsequent chapter.

Voluntary action may be regarded as habit in the

process of formation. Voluntary action is characterized by a "feeling of effort." This consciousness of effort has the same origin and explanation as effort in secondary attention already described. It is due to conflict of tendencies. The new habit in process of acquisition may be in conflict with some other habit or instinctive tendency. In this case there will be a consciousness of effort, and the behavior will be described as voluntary until the habit is firmly established. Then the awareness of effort will disappear. Voluntary action is thus a stage in the process of habit formation.

ABNORMALITIES OF HABIT

A great many abnormalities fall under this general heading. Abnormal affective habits are described in Chapter X, "Feeling," and Chapter XI, "Emotion"; and abnormal habits of thought, of perception and of reasoning are considered in the chapters treating of these subjects. The abnormalities in personal and social habits, and in habits of skill are too numerous to be discussed in detail, and only a few of the more striking anomalies will be considered. These fall into the general categories of "loss of habit" and "unusual habits." The unusual habits are especially varied and manifold, but only the unusual impulsive and inhibiting habits are described here.

Apraxia.—Apraxia is the loss of habit. Its most characteristic form is the loss of ability to perform an act of skill. It must be distinguished from paralysis, which is the entire loss of capacity to move the paralyzed limb. In apraxia the capacity for movement is preserved, but the finer motor coördinations involved in skilled behavior are lost. In other words, original motor capacity is preserved, but acquired coördinations are lost. The subject

thus reverts to his condition before the habit was formed. Agraphia and aphasia are two special forms of apraxia involving writing and speech habits respectively. These are described in the following chapter.

Apraxia sometimes follows shock due to cerebral hemorrhage. On recovering from the shock, the patient discovers that he is unable to perform some customary act of skill such as lacing his shoes, playing billiards, writing or speaking. Apraxia also occurs in the deterioration of general paralysis and other organic dementias. The patient not only loses the skill involved in simple acts like buttoning his clothes, but he may also lose the more complicated social and personal habits and habits of control.

The neurological basis of apraxia is probably a lesion or a functional dissociation involving the neurons concerned in motor coördination. These neurons are adjacent to the motor projection centers. In apraxia the latter centers are intact, but the adjacent coördinating centers are diseased or dissociated. A person suffering from an organic apraxia may regain the lost skill by a long process of reëducation similar to that involved in the formation of the original habit. In this case new connections are established through other neurons which function in place of the destroyed ones. The lost coördinations are thus restored.

Abnormal impulsion and inhibition.—There are a number of interesting abnormalities that result from *lack of balance between impulses and habits of control.* Impulses and their expression in behavior may be due either to original nature or to experience, while the control of the impulses is acquired. The most common abnormalities of the impulses, whether original or acquired, are excess or deficiency in intensity. These are

fundamentally variations in the general store of energy which may be expressed in one or more habitual or instinctive channels. The habits of controlling the impulses may likewise be unusually strong or unusually weak. There thus result four types of abnormality which may be described as: excessive impulsion, deficient impulsion, excessive inhibition, and deficient inhibition.

Excessive impulsion.—This may be general or specific. In other words, it may involve the majority of the impulses or only one specific impulse. In the first case there is a general access of energy or "pressure of activity" such as may be found in so-called "live wires" and in the manic phases of manic-depressive insanity. In the second case some specific impulse is unusually intense and may be uncontrollable. This may be illustrated by many specific manias, for instance, kleptomania, the uncontrollable impulse to steal; pyromania, the impulse to set fires; dipsomania, the periodic impulse to drink intoxicating liquors; and various sexual and homicidal manias. Other abnormal impulses were referred to in Chapter IX, "Reflexes and Instincts."

A distinction is sometimes made between *impulsive* manias and *compulsive* manias. The former are impulses which the patient regards as belonging to himself and part of his own personality. The latter impulses are similar in nature and origin, but the patient regards them as somehow forced upon him from without, perhaps by some malevolent power. In the one case the subject feels impelled, in the other he feels compelled to action. In everyday life, habit impulses are frequently intensified when the customary behavior is for any reason impossible. For example, a person may have an intense impulse to smoke when he has no cigarettes, or to do a thing that is

prohibited. A prohibition always intensifies the impulse to do the prohibited thing.

Deficient impulsion.—This also may be general or specific. In the first case all impulses lack their usual intensity. Such a general decrease in energy or drive occurs in fatigued states, in lethargic conditions, and in physical illness. It is often accompanied by apathy or loss of feeling. In the second case, some specific impulse is unusually weak. For example, there may be deficiency in the impulse to fight, to escape from danger, to achieve power and wealth, or to find a mate. The strength of these and other impulses varies greatly among different individuals, and in the same individual at different times.

Excessive inhibition.—An excess of habits of control may likewise be more or less general, or definitely specific. In other words, there may be an exaggerated control of a number of the impulses, or of only one of them. Exaggerated habits of control often result in the overt manifestation of behavior just the opposite of what would result from the inhibited impulses. Thus, inhibition of the sex impulse may lead to extremely prudish behavior, and inhibition of the ego instinct may lead to an appearance of unusual modesty and self-effacement.

Excessive inhibition sometimes takes the form of *aboulia* or "blocking of the will," when the subject seems quite unable to do what he really wants to do. There is a tremendous resistance against one or every impulse. This phenomenon occurs in everyday life on those occasions when we wish to perform some act, perhaps of kindness, and feel quite unable to overcome the inhibitions or counter impulses. It also occurs in psychasthenia which is characterized by chronic indecision and exag-

geration of the feeling of effort due to the conflict of impulses and inhibitions.

In dementia præcox a patient will sometimes be observed to begin a response which is suddenly checked or modified by the inhibiting counter habits. For instance, if the patient is asked a question, his lips may begin to move and then suddenly become pressed together tightly. Similarly, if one offers to shake hands with the patient his hand may start to move forward and then stop and move in the opposite direction or go through some peculiarly modified form of movement. In fact, any suggestion to action may result in the opposite form of behavior. For this reason the phenomenon is sometimes called contra-suggestibility or negativism. It will be further considered in Chapter XVIII, "Imitation, Suggestion and Hypnotism."

Deficient inhibition.—This is failure to develop habits of control, or loss of those which have been developed. Deficient inhibition may likewise be more or less general in the sense that there may be lack of controlling habits for a number of impulses, or for only one. A person may not have developed control for one particular impulse such as the pugnacious impulse, the acquisitive impulse, or the sex impulse. But the lack of control may be more general. Children at first have no habits of control because they have not yet acquired them. Consequently every impulse flows quickly into action.

Alcohol removes the inhibiting habits and consequently in alcoholic intoxication impulses also flow readily into action. A similar condition is found in some mental diseases which affect the inhibiting powers of the individual. This usually occurs in exalted and manic states, and also in some forms of dementia in which the de-

teriorating process at first destroys the controlling habits. Deficient inhibition may likewise occur in physical illness and during convalescence from or incubation of a disease.

In all these cases there is increased readiness to react which may take the form of unusual responsiveness to internal or external suggestions. For example, in dementia præcox a patient may obey commands immediately and automatically, or he may imitate the behavior or speech of any person who addresses him. This is a form of hypersuggestibility which will be described later. Furthermore, the lack of inhibiting powers may result in the continual repetition of any act that has once been performed. The patient repeats over and over again the same movement or the same words. This perseveration of movement is similar to the persistence of some trivial idea or impulse in everyday life. A person may be obsessed with a snatch of verse and be quite unable to inhibit or control the continual repetition of this verse in thought.

It may be difficult practically to distinguish between excessive impulsion and deficient inhibition. A very active person may be one who has an unusual amount of drive, or one who has poor control over normal or even deficient impulses. In the same way, it may be difficult to distinguish between excessive inhibition and deficient impulsion. In both cases a person will be inactive and unresponsive. In the one case, however, he is inhibiting a normal or even excessive drive, and in the other case he lacks the impulse to action. Only careful observation will enable the student of behavior to make the distinction between a man who lacks drive and an inhibited man of energy, or between a man who has excessive drive and a man who lacks control of his impulses. An extremely active man may be in reality a "dynamo," but he is just

as often a "spinning top" driven by a small impetus but checked with only a minimum of resistance. A stable balance of impulsion and inhibition with reference to all the various drives is a difficult goal to achieve.

CHAPTER XIII

LANGUAGE HABITS

There are other forms of communication in addition to speech and writing. The language of gesture and facial expression is probably the most primitive form of language and remains an important means of communication among advanced peoples. Then there are various sign languages, such as the language of the deaf and dumb and the language of telegraphy. All the different forms of communication are acquired in similar ways, but only speech and writing will be considered here.

Learning to talk.—The child learns to speak in much the same way as he acquires other acts of skill. He begins with an original repertory of vocalizations. This repertory consists of thirty to forty monosyllabic sounds. These sounds are produced at random on various occasions. Then by chance a sound is made which is particularly appropriate in some situation. For instance, the baby may produce the sound "da" when his father comes into the room. This chance success is followed by the smiles and approval of the parents. It then occurs more and more frequently, becoming stamped in by repetition. The child has learned his first word. Other simple words are learned in the same way.

The next step is to combine these simple monosyllabic sounds into more complex words. All children seem to take great pleasure in endlessly repeating sounds and simple words in various combinations. Some of these

combinations are by chance meaningful words which are stamped in as above, and become additions to the growing vocabulary. The child also hears words spoken by others and attempts to imitate them. The first attempts are often very far afield, but a successful response once made affords great pleasure to the child who receives the commendation of the family. Even phrases and whole sentences are learned as units in this way. With the addition of each new word and phrase the learning of a language is positively accelerated. The child's activity in playing with words also facilitates the learning process. In certain mental diseases there is sometimes a reversion to this childhood tendency to play with words and to create nonsense words or "neologisms."

The process of learning a foreign language by an adult is similar except that the random nature of the first trials is not so obvious. The adult makes use of numerous speech habits and ideas already acquired. He also tries to imitate the pronunciation of his teacher. His first attempts are, like the child's, often far from correct. But after a number of trials he reproduces the correct sound by chance. This performance gives him satisfaction and is repeated until it becomes firmly established. A vocabulary is thus gradually acquired. The acquisition of phraseology and sentence structure follows the same general course as the acquisition of vocabulary.

Learning to write.—Later on the child learns to write. Here again the first attempts are largely in the nature of random movements. But the trial and error method is already somewhat disguised by previous acquisitions. The child has acquired a number of hand and finger habits, which are added to his original repertory of responses. Moreover, his attention is directed to his hand and its

movements by the fact that he is holding a pencil and copying a pattern, and consequently the resulting movements are not altogether random. There are, nevertheless, many superfluous movements not only of the fingers but even of other parts of the body, such as the mouth or the feet. In learning to form a letter these superfluous movements are gradually eliminated, and the written result conforms more and more to the copy. The pleasure afforded by every success is again an important factor in the process.

In learning to write, letter habits are usually formed first. These letters are then combined into words by a similar process, but the randomness of the trials is less apparent because habits already formed are being used. When word habits are acquired, whole words are written by a single organized habit impulse. These word habits may be further combined into phrase and sentence habits, and finally even punctuation and paragraphing may become habitual. At this final stage a person is able to think of the content in writing while the form takes care of itself.

Learning the meaning of words.—This has already been described in Chapter VIII, "Perception." The process of attaching meanings to sounds and written symbols is essentially the same as the process of habit formation. It is primarily a matter of establishing connections or associations between spoken or written words and objects. For example, the sound of the word "cat" is heard when that particular animal is seen. The two impressions therefore become associated so that later the sound "cat" will arouse an image or idea of the object, or the visual impression of the object will arouse the image of the word "cat." In the same way, sounds are connected with pic-

tures of objects, with behavior responses, and at a later date with attributes and abstract qualities of persons or things.

Similarly, written symbols become associated with actual objects, with pictures, with movements, or with abstract qualities. It is important to note in this connection that the written unit which becomes thus associated is a whole word or phrase and not a single letter. Children learn to read by words rather than by letters. The impression of the whole word is associated with an object or a previously acquired idea. This word unit may be broken down later into phonetic elements or into letters for purposes of spelling.

The psychophysiological processes in a conversation.—The mental processes in carrying on a conversation are very complex, involving almost the entire mental life. The essential factors may be brought out in an analysis of the simple process of hearing and answering a question. The first factor in this process is *sensation*—the sounds are heard. The second factor is *perception*—the sounds are given meaning and the question is understood. The third factor is *ideation*—there is an arousal of many associated ideas. The ideas are mobilized. The fourth factor is *selection* of some particular idea for the response. This involves attention and discriminating judgment. The fifth factor is the *impulse* to respond and, objectively, the *response* itself.

The neural mechanism involved in the process is probably as follows: The first factor is activity in the auditory *sensory area*. This activity of course results from stimulation of the sense organ and transmission of the nerve current along the sensory pathway to the auditory receiving station in the superior temporal gyrus. The second factor

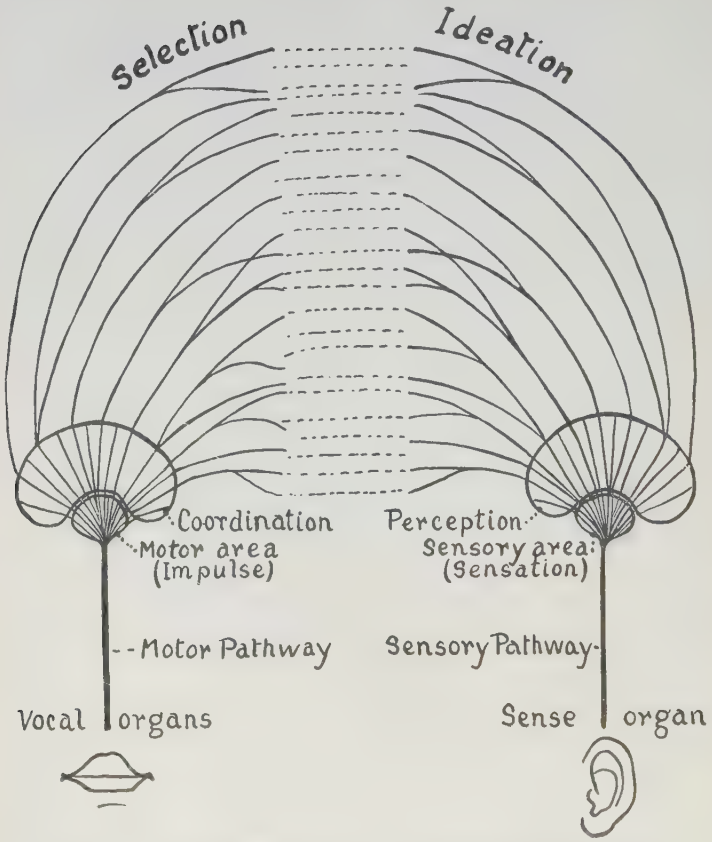

FIG. 20. DIAGRAM REPRESENTING THE PSYCHONEUROLOGICAL PROCESSES IN AN ORDINARY CONVERSATION

See pp. 239-241 for further explanation.

is chiefly the functioning of neural connections in the areas surrounding the sensory area. It is the first *divergence* of neural activity from the sensory area. The third factor is the further divergence of neural activity into various parts of the cortex. The fourth factor is *convergence* of these neural processes. The fifth factor in-

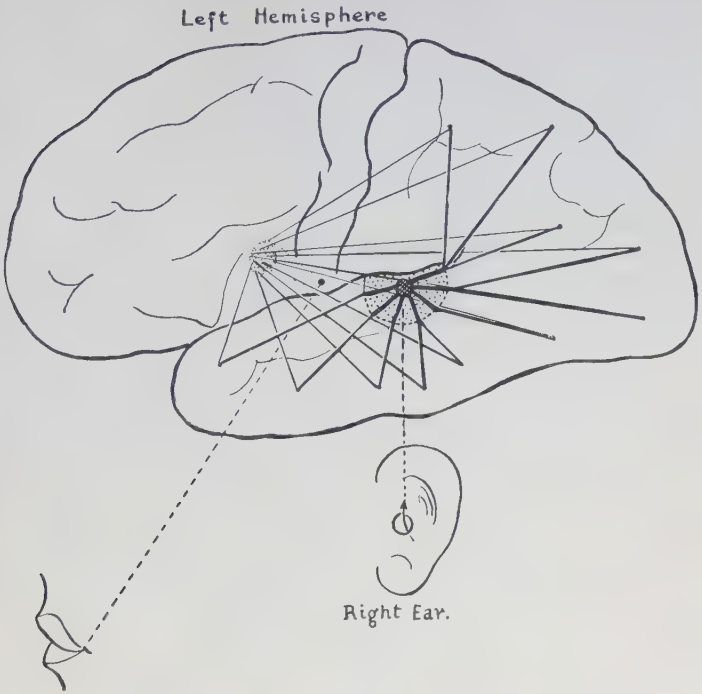

FIG. 21. SCHEMA OF THE NEUROLOGICAL PROCESSES IN A CONVERSATION

The same as Fig. 20, except that the relation of the processes to the brain is more definitely indicated. The lines diverge from the auditory sensory area in the temporal lobe just below the fissure of Sylvius, and converge upon Broca's area in the inferior frontal gyrus. See pp. 239-241.

volves two relatively separate neurological processes. First there is the final convergence of the nerve currents upon Broca's area whose function is the *coördination* of motor nerve currents going to the organs of speech. The second process is the actual *emission* of the synchronized efferent currents from the primary motor area over the motor pathway to the organs of speech. This neural mechanism is illustrated by the diagrams in Figures 20 and 21.

The psychology and neurology of reading a question and answering it verbally are the same as above, except that the process starts with the visual sense organs. There is probably a similar neural mechanism from every sense organ to the organs of speech. Furthermore, the processes in hearing a question and writing the answer would be the same, except that the process ends with the writing muscles instead of the organs of speech. There is probably a similar mechanism from each sense organ to every group of responding organs.

ABNORMALITIES OF SPEECH AND WRITING

There are numerous abnormalities of language. Many of these are merely individual idiosyncrasies with no pathological significance. They are merely unusual habits, and some of them may be habits which constitute definite social handicaps. Other abnormalities of language result from definite organic or functional diseases. In general, the abnormalities of speech and writing are similar to those found in other forms of behavior. Only a few specific abnormalities are described by way of illustration.

Paralysis of the organs of speech.—There may be a loss of the ability to speak because of an actual paralysis of the tongue, larynx, or other organs of speech. Such a paralysis may be organic and due to lesion in the motor projection area of the cortex or in the motor pathway to the speech muscles. There is a disease of the motor nuclei in the medulla, progressive bulbar paralysis, which results in paralysis of the speech organs. Paralysis of the speech organs may also be functional and occur as a hysterical symptom. In such cases it is probably due to a functional dissociation involving the primary motor area of the cortex. This form of paralysis may disappear quite

suddenly, or may be removed by some form of suggestive therapeutics.

Paretic speech.—In general paresis there is a progressive weakening of the muscles and incoördination of the finer movements, especially those involved in speech or writing. There results a characteristic form of speech which may be described as drawling, indistinct, and tremulous. Sometimes whole syllables are omitted, or syllables are interchanged or reduplicated. Occasionally there may be deliberate enunciation of each separate syllable, resulting in so-called "scanning speech." A patient is sometimes tested for paretic speech by being required to say certain difficult words or phrases such as "electricity" or "Methodist Episcopal." A characteristic paretic pronunciation of the latter term is "Meth-ist Pis-pal."

Aphasia.—Aphasia is a specific kind of apraxia and has the same general characteristics and explanation. It is loss of the ability to use articulate language not resulting from amnesia or imperception and in the absence of paralysis. The patient can hear and understand spoken language and can recall ideas associated with the words heard, but he cannot produce the coördinated responses necessary for articulate speech, although he is still able to move the speech organs and to vocalize. In other words, the patient reverts to his original inability to speak before he acquired this particular habit of skill. Aphasia is usually organic and due to lesion in Broca's area, which is the motor coördinative area for speech responses. This area is in the inferior frontal convolution, and is in the left hemisphere in the case of right-handed persons.

It is obvious that a person will also be unable to speak, if he cannot think of anything to say or cannot recall

what he wants to say; and it is likewise clear that he may be unable to speak, if he suffers from imperception such as word deafness. The inability to speak in these cases has been called "sensory aphasia." This inability is, however, an indirect result of abnormality of memory or perception, and it is not primarily a disorder of speech at all. It is, therefore, better not to confuse it with aphasia proper by describing it as a form of aphasia. There is nothing but tradition to warrant this confusing terminology.

Lisping.—The typical form of lisping is inability to pronounce the letter *s*, but inability to pronounce the letters *l* or *r*, and various forms of "baby-talk" are similar speech anomalies. Scripture has distinguished between negligent, organic, and neurotic types of lisping.[1] The negligent forms are merely due to the formation of careless habits of speech in childhood, and to the persistence of these habits into adult life. They can be corrected by reëducation. The organic forms of lisping are due to defects in the organs of speech, such as cleft palate or tied tongue. The neurotic forms of lisping are really symptoms of nervous disorders which are usually of a functional nature. They can, therefore, be corrected only by the usual procedures in the treatment of the functional neuroses, namely, by suggestion, psychoanalysis, or reëducation.

Stuttering and stammering.—These two abnormalities of speech are sometimes differentiated, and sometimes regarded as synonymous. Stammering is a hesitation or impediment in beginning to speak. Once a beginning is made, the speech flows normally or rapidly for a few

[1] E. W. Scripture, *Stuttering, Lisping, and Correction of the Speech of the Deaf* (Macmillan, 1923).

words, when the hesitation may be repeated. Stuttering, on the other hand, is continuous repetition of certain sounds, usually a consonant at the beginning of a word. These two abnormalities may be fundamentally of the same nature. Bluemel describes stuttering as an articulatory clonic spasm of certain speech muscles with delayed action of other muscles, particularly of the larynx.[2] This delay is due to a "transitory auditory amnesia" for the sound of the vowel. In other words, there is a temporary forgetting of the vowel quality which follows the repeated consonant, and therefore the word cannot be completed.

According to other authorities, stuttering and stammering are merely bad habits originating in childhood. These habits may be due to imitation of a stuttering friend or playmate. Dunlap has suggested that the stuttering habit arises as a result of the necessity of frequently checking speech responses.[3] For instance, a child must check the tendency to swear or to use obscene language. In corroboration of this view, Dunlap reports cases of stutterers who recalled having had this experience, and he also refers to the fact that there are more stutterers among boys than among girls. The assumption is that boys have a stronger impulse to use obscene language than girls, and therefore have greater necessity for checking certain speech responses in the presence of parents or teachers.

Another view is that stuttering originates in emotional disturbance such as intense fear, or that it is due to some repressed childhood experience of an emotional nature. Stammering, in particular, is fairly obviously related to

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[2] C. S. Bluemel, *Stammering and Cognate Defects of Speech* (Stechert, 1913).

[3] Knight Dunlap, "The Stuttering Boy," *Journal of Abnormal Psychology*, 12 (1917), 44-48.

intense emotional conflict. Two or more impulses are striving for expression and effectively block each other for a short time. Once the stuttering or stammering habit is established, it is difficult to overcome. It is intensified in an emotional situation, and emotional situations arise very frequently, for the stutterer has a feeling of inferiority and easily becomes embarrassed when he attempts to speak. This embarrassment only exaggerates the symptom. Stuttering, like other speech disorders, is very difficult to handle from a therapeutic standpoint. It is an extremely complex problem and a field for special study. There are now specialists in speech training, who devote themselves to the study of the causes and correction of speech disorders.

Mutism and aphonia.—Mutism may be the result of deafness. The subject is unable to speak because he cannot hear spoken language. Nowadays deaf children are taught to speak by special methods involving the other sense organs. Mutism may also be due to paralysis of the speech organs, and temporary mutism is sometimes due to functional paralysis of these organs. Mutism may in addition be due to excessive inhibition of speech responses, resulting from overdevelopment and exaggeration of habits of speech control. This abnormality generally occurs along with the other symptoms of excessive inhibition and negativism described in the last chapter. Aphonia is whispered speech and is usually due to deficient impulsion or lack of energy. It occurs in depressed and lethargic states, and also sometimes in hysteria and emotional disturbances.

Schizophasia.—This is a disorder of speech in which the subject produces meaningless sounds. Sometimes these sounds are given meaning by the patient, and they are

then called neologisms. In dementia præcox a patient will occasionally create a new language which has, of course, a meaning only to himself. This language suggests the gibberish and the fantastic languages that children sometimes playfully create. Adults otherwise apparently normal have also been known to originate and speak "an unknown tongue." In such cases the language is merely a subjective creation, and represents no actually existing "tongue." Schizophasia, as the term implies, is a form of dissociation involving words and their meanings. Words are split up and then connected into new and fantastic combinations. A person who has this symptom may likewise develop the delusion that he has the "gift of tongues." Defects and disorders are often regarded as special qualifications by the afflicted persons and their friends.

Other abnormalities of speech.—A relatively common abnormality of speech is the excessive impulse to talk, resulting in extreme garrulity. This occurs in exalted and manic states and occasionally in otherwise normal persons. A special form of it is the uncontrollable impulse to use obscene language which has been regarded as a form of sex perversion. Another abnormality of speech is agrammatism, which is a marked disorder in syntax or the use of grammar. It is frequently found in idiots and in other persons who use "baby-talk" in adult life. The abnormalities described are only a few of the numerous anomalies of speech that occur both in health and in mental disease.

Abnormalities of writing.—Many of the abnormalities of writing are similar to those of speech. There may be functional or organic paralysis of the hand. An interesting form of functional disorder is known as "writer's

cramp." This is a disability to write because of tremor, pain, or paralysis of the hand whenever a pen or pencil is taken up. It may be due to fatigue, loss of interest, or some deep-seated prejudice or emotional attitude against writing. In general paresis the writing shows peculiarities similar to those in paretic speech; and in senility and nervous conditions the writing is often characterized by marked irregularities due to tremor.

Loss of ability to write may result from loss of the coördinations that were acquired in learning to write. This special form of apraxia is called *agraphia*. It is similar to aphasia, and is probably due to lesion or dissociation involving the motor coördinative area for writing. This area is in the middle frontal gyrus of the left hemisphere in right-handed persons. In agraphia, like other forms of apraxia, the lost function may be recovered by a process of reëducation. The patient must learn to write again, just as he previously learned in childhood.

There is a peculiar form of writing usually described as "mirror writing," because it looks like ordinary writing when it is seen in a mirror. This form of writing may be learned by any person, but it sometimes occurs spontaneously when a right-handed person attempts to write with the left hand. It is also occasionally found in the writing of feeble-minded persons.

Automatic writing has already been described. It is not so much an abnormality of writing as of the personality as a whole. It is due to a dissociation in which the writing is under the control of a relatively independent neural system. This system is split off from the systems which constitute the neural basis of the main personality.

There are many abnormalities in writing which may be regarded as individual peculiarities in writing habits.

It is possible that these writing habits may be correlated with other personal habits, and much might be learned about an individual from his handwriting if we knew the relationships. The reading of character from handwriting is an old problem and a very real one. However, very little accurate scientific work has been done on the subject. It is therefore not definitely known whether, and to what extent, writing habits are correlated with other habits. It is a good guess, however, that large, showy writing indicates an exalted or manic state, while small cramped writing indicates a depressed or restrained condition of the writer.

Abnormalities in the process of communication.— The psychological and neurological processes in communication were described previously and illustrated diagrammatically in Figures 20 and 21. It was shown that communication involves more than speaking or writing. It involves also hearing, understanding and thinking. Some of the abnormalities in this total process may now be considered. These will be better understood by referring to the diagrams on pages 240 and 241.

The process of hearing and answering a question may be prevented by the following abnormalities. In the first place, there may be an *auditory anesthesia.* The sounds are not heard. This might result from a disorder of the sense organ, the sensory pathway, or the sensory area of the cortex. Secondly, the sounds may be heard but may not arouse any associated ideas. This is *imperception.* It is due to a disorder involving the first system of pathways diverging from the sensory area. Thirdly, further ideas may not be aroused. This is *amnesia* or loss of memory. It may be due to lesion or functional dissociation involving widespread areas of the cortex. Fourthly,

the subject may be unable to select a specific idea from those aroused. This is a *disorder of attention and judgment,* and may be due to neural disorder affecting the converging systems and pathways. Fifthly, there may be a loss of the ability to coördinate the motor nerve currents. This is *aphasia,* and is due to disorder in Broca's area. Finally there may be *paralysis* of the speech organs. This would be due to disorder in the motor emissive area, or in the motor pathway to the speech organs. Similar losses of function may occur in the systems from any sense organ to any responding organ.

It will be observed that anesthesia and paralysis are alike in that they are both losses of original capacities, namely, sensory and motor capacities. Imperception and apraxia, on the other hand, are both losses of acquired capacities. Imperception bears the same relation to sensation that apraxia bears to reflex and random movement. In imperception the sensations are preserved, but their associations with each other and with ideas are lost. In apraxia the random and reflex movements are preserved, but they are not coördinated with each other to form acts of skill.

CHAPTER XIV

MEMORY

Memory from a behavioristic point of view is the persistence and reproduction of acquired forms of behavior. It is the recurrence of habitual action patterns, such as greeting a person by shaking hands and saying, "How do you do?" Subjectively, memory is the conscious experience of past events at the present time. This is memory in the traditional sense. Memory in this sense may be regarded as the central problem in introspective psychology. It is difficult if not impossible to form a conception of a consciousness without memory. Such a consciousness would be merely a succession of unrelated flashes of experience separated by intervals of mental darkness. Each flash of consciousness would be unaffected by the preceding one, and would consequently consist only of simple sensations, feelings, or impulses. Perception would not be possible. There would be no sentiments, no thought, and no awareness of personal identity from one moment to another.

Processes of Memory.—Memory is not a general faculty or power of the mind. It consists, rather, of a number of specific processes, such as memory for words, memory for digits, and memory for this or that event. We should therefore speak of *memories* in the plural rather than of *memory* in the singular. These specific memories are more or less closely correlated. In other words, good memory for one sort of material is more

likely to occur with good than with poor memory for other things. But memory may be better for some things than for others. The correlation of memories is not sufficiently close to warrant the conclusion that memory is a single factor or process.

Even the specific memories are not simple unitary processes. They may be analyzed into more elementary factors. A complete specific memory is based upon at least four processes, namely, impression, conservation, reproduction, and recognition. For instance, memory of an event in childhood depends upon the impression made on the psychophysical organism by the event, the conservation of that impression, its reproduction in consciousness, and its recognition as belonging to one's own past life. These four processes are considered separately.

Impression and fixation.—This also depends upon other factors. In the first place, an event must be perceived or reacted to in order to leave an impression. It is not sufficient that the event should merely occur in the physical environment. It must have affected the psychophysical organism. Secondly, impression depends in part upon attention. It is true that an object or event not attended to may leave an impression. Such a marginal or *subliminal* impression may later be reproduced in consciousness, and the subject then becomes aware of a past event which he feels he never experienced. The revival of subliminal impressions may thus account for some apparently mysterious or occult phenomena often erroneously ascribed to telepathy. As a rule, however, the more an event is attended to, the more likely it is to leave an impression and be remembered later. Thirdly, the fixation of an impression also depends upon the entire learning process which was described in Chapter XII.

The view has been expressed that impressions are registered upon the mind and conserved as ideas in a so-called subconscious mind; but a more reasonable view is that impressions are made upon the nervous system and conserved as some sort of traces in the brain. It seems probable that the formation and fixation of an impression is really the formation and fixation of new bonds or connections among neurons. This means the formation of a new arrangement of neurons. Such an arrangement is a so-called neural pattern or neurogram. Memory traces are thus not effects in cells but in the arrangement and relationship of cells. The whole learning process reduces itself to the formation and fixation of neural patterns of various forms and different degrees of complexity.

Conservation.—This is the persistence of the impression that has been made. The neural patterns which were formed as a result of perception, attention, and the learning process are retained. These patterns are, however, affected by general biotrophic changes and by pathological processes. Connections or associations between cells are gradually broken down as a result of the ordinary changes that are continually taking place in living matter. Neurograms may also be obliterated more rapidly by various pathological processes. Thus there may be some loss of memory due to the normal brain changes of life, and considerable loss due to organic diseases of the brain.

Conservation is also affected by further mental activity immediately following the impression. It seems as if neural patterns require a certain amount of time to become set or stabilized, and immediately succeeding neural activity interferes with the process of fixation. This interference is sometimes called "retroactive inhibition." It may be avoided by interpolating rest periods between

successive trials in the learning process. A mental or physical shock has a similar inhibiting effect upon the memory for events just before the shock.

Reproduction.—This is the revival or reinstatement of any idea or action that was impressed and conserved. Revival is due to reactivation of neurograms that were previously organized and have been retained. Reactivation is dependent upon *associative tendencies*. These are tendencies for the nerve current to pass from any neurogram into others that were formed or were previously active at the same time. Reproduction is also sometimes said to be a result of *perseveration,* the spontaneous reactivation of a neural pattern; but it is very questionable whether spontaneous reactivation ever actually occurs. The phenomenon called perseveration is probably due to neural facilitation and indirect association.

Very much more is retained than can be reproduced under normal conditions. In other words, forgetting is due chiefly to inability to reproduce what is conserved and not to actual obliteration of neural traces. Inability to reproduce is ordinarily the result of functional dissociation. This form of dissociation is due to increase of resistance in the pathways leading to the neurograms concerned. Such an increase is probably some sort of blocking of the synapses in the pathway. This blocking is usually of a temporary nature. What is forgotten at one time may therefore be recalled easily at another time. An organic brain disease may also result in blocking of pathways and consequent dissociation, as well as in obliteration of neural patterns. The loss of memory in organic brain diseases is therefore in part due to elimination of neural traces, and in part to organic dissociation of neural systems.

All reproduced behavior is objectively regarded as memory. When a person repeats some act of skill or social behavior that he has learned, the external observer calls it memory. On the other hand, all reproduced ideas are not memory ideas to the subject concerned. In constructive imagination and in reasoning the ideas involved are reproduced from past experience, perhaps in new combinations, but reasoning is not therefore regarded as memory. Memory ideas are reproduced ideas that have a past reference. Reproduced ideas may refer to the present as in reasoning; they may refer to the future as in anticipation; or they may refer to the past. The temporal reference of ideas is dependent upon their association with ideas of time such as calendar dates. For example, in anticipating a banquet the ideas involved come from past experience but are associated with a future date; while in remembering a banquet similar ideas are associated with a past date.

Recognition.—The fourth factor in memory as a subjective process is recognition. This is a "knowing again" of the event as an occurrence in one's own past life. Recognition is dependent upon two factors. The first is association of ideas of time and place. This gives the event a past reference and a localization in time and place. There results a *definite recognition.* The second factor is the arousal of a pleasant feeling known as "the feeling of familiarity." Sometimes this feeling of familiarity occurs in the absence of the associated ideas. Then we have *indefinite recognition.* The reproduced idea seems familiar but cannot be definitely placed in the past. The account so far concerns recognition of ideas, but recognition of perceptions, as of persons and places, is a similar process. A person is recognized definitely when

adequate associations of time and place are aroused. He is recognized indefinitely when only the feeling of familiarity is aroused.

Forgetting.—Forgetting may be due to fading out of impressions, or to inability to reproduce and recognize what is retained. This inability usually results from functional dissociation and accounts for most of the forgetting in everyday life. Some so-called forgetting is also due to the fact that impressions were never adequately made. Attention was at fault, or the learning process was not sufficiently complete to begin with. Such inadequate impressions no doubt explain why the summer tourist remembers so little after returning from his vacation trip.

Ribot has formulated what he called "the law of regression" in forgetting.[1] According to this law, forgetting "descends progressively from the unstable to the stable." Ideas are thus forgotten before actions, and recent events are forgotten before the more remote. The ideas and the recent events are dependent upon neurograms that are not so firmly established. It has also been shown that forgetting is slower for meaningful material than for meaningless material that has been learned by rote. The rate of forgetting is at first rapid and then slower and slower as time goes on. Figure 22 shows three curves of forgetting. The vertical line represents the amount remembered, and the horizontal line the amount of time after the original learning. It will be observed that the curves drop at first rapidly and then more and more slowly towards the base line.

Experiments have also shown that the ability to recall is lost more readily than the ability to recognize. If a

[1] Théodule Ribot, *Diseases of the Memory* (Fitzgerald, 1882).

person learns a list of words or nonsense syllables he may after an interval of time be unable to recall any of them, but he will still be able to recognize them if they are shown to him along with other words that he has not learned. As a result of forgetting, the memory for past

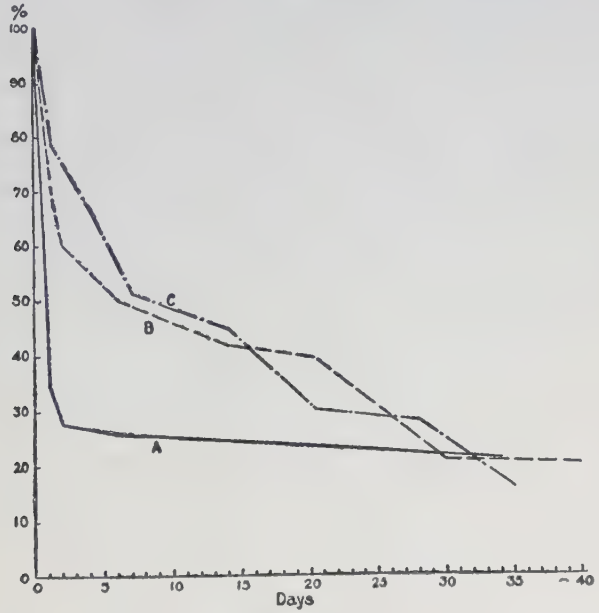

FIG. 22. "CURVES OF FORGETTING"

The curves show the results of experiments on learning and forgetting by three different investigators. *A* and *B* memorized nonsense syllables. *C* used series of jumbled letters. The curves show the percentage recalled after various time intervals. (After Starch, from Warren, *Elements of Human Psychology,* Houghton Mifflin, 1922.)

events is usually incomplete and is very liable to error even among normal and healthy persons.

Individual differences in memory.—Persons differ greatly in their abilities to remember various kinds of things. This has been shown by the results of numerous experiments in which memories were tested. For example,

individual differences were found in memory for digits, in memory for words, in memory for diagrams, in memory for pictures, and so forth. Differences were also found in rote memory as compared with logical memory. *Rote* memory is exact word-for-word memory of material learned, while *logical* memory is memory for the meanings and not for the exact words. Some persons excel in rote memory, others in logical memory.

A distinction is made between immediate, recent, and remote memory. *Immediate* memory is memory for material just perceived. It is the kind of memory required by a telephone operator who tries to remember the numbers just heard. *Recent* memory is memory for events of the day or the recent past. It is the kind of memory required by a student to pass an examination. *Remote* memory is memory for long past events, like those of childhood. It is the kind of memory involved in reminiscence and story-telling. Old persons usually have better memories for remote events than for recent events. Any person may have good immediate memory and yet have poor memory over a longer period of time, and vice versa.

Studies have been made of sex differences in memory. Most of the investigations have shown very little difference between males and females, but what difference there is seems to be in favor of the women. Age differences have also been studied. It used to be supposed that memory in childhood was better than in adult life. More recent studies indicate that this view is questionable; and it now seems likely that ability to learn and to remember improves with age up to a late period, at least well into middle life. Children appear to learn more readily and remember better than adults merely because at that period their main business in life is learning. Adults are

unable or unwilling to devote the same time and effort to such tasks.

ABNORMALITIES OF MEMORY

The abnormalities of memory are of special importance, since they have an indirect effect upon so many other mental processes, such as perception, reasoning, imagination, and so on. Thus imperception, described in Chapter VIII, may be regarded as a form of amnesia. The abnormalities of memory are also interesting because they are of relatively frequent occurrence in everyday life. It is thus particularly difficult to distinguish between the normal and the abnormal, as between normal forgetting and abnormal loss of memory. Abnormality of memory is due to abnormality in one or more of the factors upon which memory depends. These factors have been described above. The abnormalities of memory fall into three typical categories, namely, deficiency of memory or amnesia, excess of memory or hypermnesia, and false memory or paramnesia.

Amnesia.—This is abnormal forgetting or loss of memory, and may be general or partial. *General* amnesia involves all ideas and perhaps even acquired actions, while *partial* amnesia is limited to certain special memories. There may be amnesia for numbers, for names, for certain special events, or for the experiences depending upon a special sense. A particularly interesting form of partial amnesia is that in which there is loss of memory for a *special epoch* or period of life. For instance, one patient had complete loss of memory extending back for a period of seven years. He had normal memory for events at an earlier date, but little or no memory for events or for persons met during the seven-year period. This

form of amnesia may constitute a gap in the sequence of memories. The subject remembers experiences before and after, but not during a particular period of life.

Sometimes amnesia takes the form of *loss of personal identity*. The subject does not know who he is, where he came from, what his occupation is, and so forth. Such cases are of considerable social importance and accounts of them are frequently found in the newspapers. A person in this condition is usually unable to make a normal adjustment to his social environment and is therefore taken into custody by the police who attempt to establish his identity. It is an interesting fact that in such cases if the patient is asked to guess what his name is, or about other things he has forgotten, he frequently guesses correctly. It will be remembered that Janet described a similar phenomenon in cutaneous and visual anesthesia. This suggests that the two symptoms are in some way similar. They are both due to functional dissociation.

Loss of personal identity is a form of dissociated personality, and *dissociated personality* is always a form of amnesia. In dual or multiple personality there are two or more systems of mental processes. Each system has amnesia for the other system or systems. Sometimes these systems alternate; now one system dominates the individual, now another. This merely means that first one system of neurograms is connected with the speech and locomotor functions, and then another system becomes connected with these functions. Such an alteration usually occurs during an interval of sleep. This phenomenon will be referred to again in Chapter XXVII, "Personality."

Amnesia results from a number of causes. In the first place, it may depend upon the fact that no adequate impression was originally made. This may have been due to

default of attention or to incomplete learning. Strictly speaking, inability to recall what was never adequately impressed is not amnesia at all, although it is usually described as "anterograde amnesia." It is of frequent occurrence in everyday life. The amnesia of students during examinations is probably chiefly of this kind. They cannot answer the questions because they did not attend during the lectures, or failed to learn the subject in the first place. In certain mental diseases in which attention is affected the patients have anterograde amnesia. It is thus quite characteristic of dementia præcox where there is frequently blocking of the attention. Anterograde amnesia is also found in feeble-mindedness and wherever there is deficiency in learning capacity.

Amnesia proper, in contradistinction to anterograde amnesia, is called "retrograde amnesia." There are two forms of retrograde amnesia, amnesia of conservation and amnesia of reproduction. Ribot's law of regression applies to retrograde amnesia. The higher and more unstable mental processes are forgotten before the older and more stable ones. *Amnesia of conservation* is due to obliteration of neural traces. These traces normally fade out gradually as a result of ordinary life changes in the cells. But they are markedly affected by pathological processes in the brain. Hence amnesia of conservation is found especially in organic brain diseases. In general paralysis of the insane there are scattered losses of memory depending upon the locus and severity of the cortical lesions. In arteriopathic diseases of the brain and in senile decay there is also usually marked amnesia of conservation.

Physical shocks such as concussion or other brain injuries likewise affect the memory traces. The shock may

affect neurograms throughout the whole cortex as well as actually destroy some neurons. After an accident a patient sometimes forgets events which preceded the accident. This forgetting is called "retroactive amnesia." It may extend back for hours, days, or even weeks before the shock. As a rule, some of the memories are later recovered, indicating that the neural traces were not obliterated but merely dissociated by the shock, but many of the lost memories are never recalled. It seems as if the traces left by recent events were not sufficiently set to withstand the neural jolt.

Amnesia of reproduction is inability to recall ideas or habits which are actually retained. The memory ideas are dissociated from personal consciousness. This form of amnesia is therefore usually temporary; the forgotten events are later recalled. Often they can be recalled only under special conditions, as in hypnosis or by means of psychoanalysis. Reproductive amnesia is the form which occurs in dissociated personality. Sometimes when one dissociated group of ideas comes back into personal consciousness, another becomes dissociated. This is the basis of alternating personality.

There are no actual brain-cell changes in reproductive amnesia. Neurons are not destroyed and the simpler neurograms are probably not disorganized. Certain neurograms are, however, dissociated from the main cortical systems as a result of increased synaptic resistance. Reproductive amnesia is thus functional amnesia and is similar to functional anesthesia and other functional abnormalities. According to psychoanalysis, the dissociation is due to mental conflict and repression. Systems of ideas are forgotten because they are in conflict with other dominant systems. Some ideas are also forgotten because they are associated

with repressed systems or complexes. This is a purely psychological account of dissociation and cannot be substituted for a neurological account. The phenomenon must be described from both subjective and objective points of view.

Reproductive amnesia accounts for most of the forgetting of normal persons. We retain a great deal more than we usually suppose, and much more than we can recall at any given moment. More marked instances of reproductive amnesia are found in the so-called functional mental diseases. It is one of the characteristic symptoms of hysteria which includes the dissociated personality referred to above. Reproductive amnesia is found also in the major psychoses such as dementia præcox and manic-depressive insanity; and even in organic psychoses the amnesia may be in part reproductive.

A fourth kind of amnesia is *amnesia of recognition.* This may refer to ideas or perceptions. In the former case ideas are retained and reproduced; but associated ideas which constitute time, place, and perhaps meaning are not aroused. Moreover, a feeling of familiarity is not elicited by the ideas. The ideas may therefore seem strange and foreign, and the person may wonder where they come from. He may believe that his ideas have a supernatural origin, or come to him as a result of thought transference.

When amnesia of recognition refers to perceptions, familiar persons and places seem strange and unreal. The perception does not arouse the customary associations nor the feeling of familiarity. Amnesia of recognition may be due to organic cell changes, to dissociation, or perhaps to disorder of feeling. An unpleasant feeling of strangeness occurs where a pleasant feeling of familiarity is usually found. This symptom is common in physical illness, in

fatigue, and in drowsiness, as well as in certain mental diseases. A feeling of unreality and strangeness is particularly characteristic of psychasthenia.

Hypermnesia.—This is exaggeration of memory or unusually vivid memory, and may likewise be general or partial. General hypermnesia involves many events of the past life, and numerous long forgotten ideas come clearly to mind. This may occur in fever, or in connection with a highly emotional incident like an accident which has threatened one's life, or in the mania of manic-depressive insanity. Hypermnesia is probably due to increased neural irritability, or to abnormal decrease in synaptic resistances.

Partial hypermnesia is the revival of isolated impressions or incidents that have long been forgotten. Some single incident of early childhood may be vividly remembered. According to the psychoanalysts, such vividly remembered experiences are often "cloak memories." They serve the purpose of concealing some more significant experience which they in some way represent or symbolize. Neurologically, vivid memories for special events may be due to removal of the resistances which ordinarily dissociate certain neural patterns.

An interesting case of hypermnesia is reported by James. An uneducated girl suddenly began to talk in the Hebrew language. Her friends regarded this as a divine gift, since she was a Gentile and had never studied Hebrew. But investigation revealed the fact that she was once a servant in the home of a Jewish rabbi, who was in the habit of walking about in his study and reading aloud passages of Hebrew. The Hebrew spoken by the girl consisted of sentences such as would be read by the rabbi on these occasions. It is therefore probable that the audi-

tory impressions received at that time were conserved and were later reproduced with sufficient vividness to permit of vocal expression. Such extraordinary cases of hypermnesia are rare, but are highly instructive. They emphasize the fact that very much more is conserved than is capable of reproduction under ordinary conditions.

Paramnesia.—This is false memory. It is remembering something that did not actually happen as remembered. A false memory is never wholly false. Its falsity usually consists in the wrong localization or past reference of an occurrence. The processes of conservation and reproduction cannot in themselves be false or inaccurate; but ideas can be referred to a wrong past, and novel combinations of ideas fabricated in imagination may be ascribed to one's actual past experience.

There are different kinds of paramnesia. Simple paramnesia or *fabrication* is the most typical form. The subject seems to remember events that did not occur. His ideas may have been taken from a book or some other source, or they may have been elaborated in the imagination from elements of his past experience. These ideas are mistaken for actual incidents of his own past life. This form of paramnesia is of frequent occurrence in daily life and is also particularly characteristic of certain forms of mental disease. One patient who spent the whole day in the hospital wards would describe in great detail many fictitious experiences. If he were asked what he had been doing all day, he would tell how he had gone to a hotel for dinner, or had been at a ball game or a theater, while in fact he had never left the wards. Such paramnesia must be distinguished from prevarication. There is no intentional falsehood. The above patient was perfectly honest in his account of his doings.

The psychoanalysts believe that paramnesia is due to unconscious desire. A person remembers what he wishes had occurred instead of what actually happened. False memory may also be due to partial amnesia. The gaps in memory are filled out with imaginary incidents. In some cases it may be due to mental confusion. An experience may have occurred similar to the fancied one, and the patient is unable to distinguish between the imaginary and the actual event. This probably accounts for the paramnesia of childhood, usually regarded as "children's lying." A child is often unable to distinguish between phantasy and reality.

Paramnesia occasionally takes the form of misinterpretation of actual past events. This form is sometimes called *retrospective falsification* of memory. It usually takes place as a result of suggestion or under the influence of a delusion. A person who develops a delusion of grandeur may reinterpret his whole past life in accordance with this delusion. Every trivial event then takes on some special significance foreshadowing his greatness. Similarly, a person may be led to reinterpret events as the result of another's suggestion. There are people who are continually looking for ulterior and sinister motives in human behavior, and who go about suggesting such motives to their more healthy-minded friends. The latter may be led as a result to put new and false interpretations upon past social incidents.

A third form of paramnesia is the *illusion of recognition* or the "illusion of having already seen." A strange person or place seems familiar and is consequently referred to one's past life, although one cannot definitely recall when and where. This is a relatively common experience of healthy persons, but it is more likely to occur in fatigue or

illness. It may be explained by supposing that some element in the novel situation was actually experienced before. The subject may previously have known a person who had similar features, or a place that had some similar characteristics. The feeling of familiarity is aroused by these elements. Ordinarily the subject realizes this and consequently feels that the situation is novel but has familiar elements. But sometimes the feeling of familiarity becomes transferred to the total situation. Then the subject feels that he has been there before, or has previously met the person, but he cannot recall when or where.

Paramnesia in all its forms is common in daily life. No person knows with certainty how inaccurate his own memory is, or whether a particular memory is false or true. Sometimes he may have more assurance that his memory is correct than on other occasions. This assurance is frequently taken as an indication of the validity of memory. Experiments have shown, however, that confidence in one's memory is no certain indication of its accuracy. Memories held with assurance are only slightly less liable to error than those held with uncertainty. Experiments have also been performed to test the validity of report of an incident. It has been shown that in reporting an incident details are not only omitted but other details which never occurred are added. Individuals differ markedly in their ability to report events with accuracy. This fact is of considerable significance in medicolegal psychology; for witnesses in court may be unable to report their experiences accurately even with the best of intentions.

CHAPTER XV

IMAGES AND IDEAS

Images and ideas are primarily subjective experiences. They can be observed only by the person who possesses them. Their objective aspect is merely activity of neural patterns in the cortex of the brain. This neural activity may sometimes find an outlet in incipient behavior responses, but these cannot be readily perceived by the external observer. Images and ideas depend upon former experiences and upon memory, that is, upon impression, conservation, and reproduction. Images and ideas, moreover, occur in succession as a stream of mental processes. This succession is dependent upon associative connections previously established.

Images.—Images are relatively simple cognitive experiences. They may be regarded as reproduced sensations, and the kinds of images correspond to the kinds of sensations. Perhaps the most common are the visual images. These may be illustrated by recalling any visual impression, such as that of a red rose or of a country landscape. Auditory images are reproductions of experiences of tones or noises. They may be illustrated by recalling the whistle of a steam engine, the crack of a pistol, or the sound of a person's voice. Kinesthetic images are reproduced sensations of movement. They may be experienced in thinking of kicking a football without actually doing so, or in thinking of the word "babble" without actually saying it. In the one case a person may have images of foot

and leg movement, and in the other images of lip and tongue movement.

Cutaneous images are recalled experiences of touch, temperature, or cutaneous pain. A person may have a distinct image of a coin pressed on the hand when there is no coin there; or he may have a vivid image of the "feel" of sandpaper, velvet, ice, or a pin prick. Taste and smell images are relatively less common and usually less vivid than those already described. But many persons are able to image the taste of sugar or the smell of tobacco smoke. Images pertaining to other sense departments such as the vestibular and organic senses also occur. Organic images are usually experienced in recalling feelings.

Individuals differ considerably in the vividness of their imagery, and perhaps also in the kind of imagery that predominates. For instance, some persons can imagine a red rose almost as clearly as they can perceive it. Both the form and the color are exceedingly vivid. Others can imagine it only in a vague way. The form appears hazy in outline and the color faded. Similar differences are found in the other kinds of imagery. Some persons can reproduce in imagination a whole musical melody after hearing it only once. Others are scarcely able to imagine a simple auditory experience like the tinkling of a bell.

In most persons visual imagery predominates, auditory or kinesthetic comes next in importance, and other kinds are less frequently experienced. A person can test his own imagery roughly by attempting to imagine a few simple experiences like the ones mentioned above. Some idea of the frequency and relative importance of the different kinds of imagery can likewise be obtained from an examination of dreams. Dreams of things and people seen are usually the most common, while dreams of

music, of people talking, and of personal activity are also quite frequent. Dreams involving other kinds of imagery, such as organic images and images of taste and smell, are less common but do sometimes occur.

Images play an important rôle in all thinking. Ideational processes are carried on for the most part in imaginal terms. Some persons think chiefly in visual terms, others in auditory or in kinesthetic terms. The images in thinking frequently take the form of verbal images or images of words. Such word-images may be visual images—the words are seen in the mind's eye as if on a printed page. The word-images may also be auditory —they are heard in imagination as the process of thinking goes on. The word-images are likewise frequently kinesthetic—they are felt as movements of the vocal organs. In this last case there may be actual incipient movements of the lips, tongue, or larynx.

The behaviorists assume that all thinking involves such incipient movements of the vocal organs, and have suggested that the process of thought might be studied by means of a sensitive apparatus that would register them. On the other hand, the question has been raised whether there can be thinking without images, whether there can be "imageless thought." While this is still a controversial matter, it nevertheless seems highly probable that thinking may sometimes take place without images. It may be carried on in purely neurological terms, or perhaps in terms of general attitude or other more specific form of behavior.

As was pointed out in the last chapter, images may refer to the past. These are *memory images*. They may also refer to the future. These are *anticipation images*. But images may not have any temporal reference at all.

These may be called *free images*. Free images occur in daydreams and reveries, in the process of reasoning, and in other mental processes, but they rarely occur alone. In the solution of a practical problem, the images usually have a definite reference to present or future time, and in daydreams images of anticipation and of memory occur as well as free images.

Ideas and concepts.—Ideas are more complex than images. They are related to images in the same way as perceptions are related to sensations. Ideas consist of combinations of images together with meanings. Meaning is a matter of context, and context consists of other associated images, words, attitudes, and perhaps purely neurological processes. The distinction between images and ideas is very well stated in the following paragraph from Stout's *Manual of Psychology:*

> An idea can no more exist without an image than perception can exist without sensation. But the image is no more identical with the idea than sensation is identical with perception. The image is only one constituent of the idea; the other and more important constituent is the meaning which the image conveys. If I think about the Duke of Wellington, the image present to my consciousness may be only the shadowy outline of an aquiline nose. But this of course is not my idea of the Duke of Wellington. My idea depends on the cumulative result of many complex mental processes, such as the reading of Napier's *Peninsular War,* etc. If I had been thinking of someone else with an aquiline nose, my mental attitude would have been very different, though I might have had the same image. The same mental image may thus have very different meanings according to context and circumstances. The meaning varies with the train of thought in which the image occurs.[1]

[1] G. F. Stout, *A Manual of Psychology* (University Tutorial Press, 1913), p. 529.

The idea of the Duke of Wellington is a *specific idea,* as is the idea of any particular man. Similarly, the idea of a particular dog or of any particular object is a specific idea. But ideas may also be *general.* The idea of man may refer to mankind in general, and the idea of dog may include the whole species. In the same way one may have a general idea of a triangle which is neither an isosceles, a scalene, nor a right-angled triangle. These general ideas are sometimes called *concepts.* They are more complex than specific ideas and perhaps represent a higher stage of intellectual development. The nature of the general idea or concept differs with different persons and also with different concepts of the same person.

In the first place, a general idea may be a *composite image.* The general idea "dog" might be like a composite photograph of a large number of different kinds of dogs. It might have the head of a greyhound, the body of an Airedale, the tail of a pointer, and so forth. In the same way, the concept "man" might be a composite image of a large number of different persons. Such composite images are not, however, the most common form of general ideas. In a second form there may be only a very specific image. The concept "dog" might consist of the image of some particular dog or perhaps only a part of a dog. This specific image, however, stands for, represents, or means all dogs. In a third form of general idea, the image of a word takes the place of the image of an actual object. The general idea of a triangle may be represented in consciousness merely by the word "triangle." In other cases a general idea may be represented by a gesture or other movement or by a general attitude.

The association of ideas.—Association in general has already been described. It includes more than association

of ideas. It means the formation of connections or bonds among any mental processes. The association of ideas in particular means the formation of connections among ideas. It refers to the fact that "a perception or idea tends to suggest another idea which was previously experienced at the same time." It must, of course, be borne in mind that ideas are not conserved as such. They are conserved as neural patterns or neurograms. Similarly, the connections formed in association are neural connections; and when one idea is followed by another it means that neural currents pass from one neurogram to another which was previously active at the same time. The causal sequence is thus neurological, while the succession of experiences is mental.

Any perception or idea may be connected through past experience with a number of other ideas. That is to say, every idea has many associations; but only one or a limited number of associated ideas follows on any particular occasion. There are certain conditions that determine which bonds are most effective and, consequently, what ideas will be reinstated. These conditions may be enumerated as *frequency, recency, vividness, emotional congruity,* and the *constellation of ideas.*

An idea or perception will tend to be followed by any idea that occurred with it frequently in the past. The idea "boy" may be followed by the idea "girl," because the two words have often been used together, or because boys and girls are often seen together. An idea or perception will likewise tend to be followed by another idea which recently occurred along with it. The idea "boy" may be followed by the idea of delinquency, if a person has recently been studying delinquent boys. An idea or perception also tends to be followed by any idea which

occurred with it in a former vivid experience. Thus the idea "boy" may be followed by the memory of some impressive event of one's own school days, such, for instance, as being punished, or achieving some social prestige.

Moreover, the ideas which follow any given perception or idea are likely to be such as will fit in with the general affective tone at the time. If a person is in a pessimistic frame of mind the ideas aroused will fit in with that particular mood. If he is in an optimistic state the ideas will fit in with that mood, and so on. In other words, the associated ideas will be congruous with the emotional and affective condition. Finally, the ideas aroused in the process of association will tend to fit in with the whole constellation of ideas in mind at the moment. For instance, the idea "rose" will be followed by quite different ideas depending upon whether one has just been reading poetry, studying botany, or working in a flower shop.

The association experiment.—The association experiment was developed from the *reaction time experiment*. The latter is an experiment to determine how quickly a person can respond to a simple stimulus. The stimulus may be of any sort, and the reaction required may also be any kind of simple or complex muscular response. In the most common form of reaction experiment the stimulus is auditory, the click of a telegraph key; and the response is pressure of the finger on another telegraph key. The interval between the click of one key and the pressure on the other is measured by means of an electrical chronometer. It is roughly about one-tenth of a second, but varies considerably under different conditions and with different subjects. The measurement of a person's reac-

tion time is supposed to have some practical significance in vocational guidance.

In the usual form of *association test* the stimulus is a word called out by the experimenter, and the response is the first word that comes to the subject's mind. The time for the associative response is longer than the simple reaction time, and may be measured roughly in fifths of a second by means of a stop watch. The experimenter starts the watch when he calls the word, and stops it when he hears the response. He keeps a record of both the time and the response. The association time differs considerably with different subjects, and with different responses of the same subject. The kind of response may also vary considerably from time to time and from subject to subject.

There are other ways of performing an association experiment. One method is called the "continuous method." In this case the subject is given a word to start with, and is instructed to respond not only with the first idea that occurs to him but also with other succeeding ideas for a definite, or perhaps an indefinite, period of time. This form of association experiment is frequently used in psychoanalysis. Both the above methods are experiments on *free association,* that is, the subject may respond with any idea that happens to be aroused. In other methods the subject is required to respond with some particular kind of idea. For instance, he may be asked to give the opposite of the word called out, or a synonym of the word. This is called *controlled association.* Experiments on controlled association may be performed in a great variety of ways. This form of association test is often used as one of a battery of so-called intelligence tests.

Diagnostic association studies.—Jung used the association experiment to ascertain the presence and nature

of repressed complexes.[2] A *repressed complex* is an associated group of ideas, feelings, and impulses which the subject has forgotten, or cannot bring to mind. These, no doubt, exist not in an unconscious mind, but merely as neural patterns and processes. The repressed complexes of most persons are somewhat similar. Jung, therefore, prepared a list of one hundred words which he thought would be associated with any repressed complexes that might exist. These words were used in a free association test as described above, and later the experiment was repeated to see whether the responses would be the same. Jung found that certain peculiarities in reaction indicated that the stimulus word had touched upon a repressed complex. These peculiarities he called "complex indicators."

Some of the "complex indicators" described by Jung are as follows: (1) delayed reaction to a stimulus word, that is, longer reaction time than usual; (2) unusual reactions, including superlative adjectives and words pertaining to the personality of the subject; (3) superficial reactions, such as a response that rhymes with the stimulus word, or merely naming some irrelevant object in sight; (4) repetition of the stimulus word, giving it with minor changes, or translating it into a foreign language; (5) perseveration of response, that is, giving the same response as was previously given to a different word; (6) giving no response at all; (7) emotional and other responses, such as clearing the throat, stammering, sighing, weeping, laughing, gesticulating, or showing surprise, anger, or fear; (8) failure to reproduce the same response on repeating the experiment.

[2] C. G. Jung, "The Association Method," *American Journal of Psychology*, 21 (1910), 219-269.

The occurrence of any of these complex indicators in connection with certain stimulus words will roughly indicate the nature of the repressed complex, which may then be further investigated by other tests or by free association in accordance with the psychoanalytic method. Jung's experiment has thus considerable significance for medical psychology. In certain psychoneurotic cases it may be of assistance in getting a better understanding of the patient and in making an exact diagnosis. It may also be the first step in psychotherapy especially if the psychoanalytic method is to be used.

The association test may also be applied in the *detection of falsehood and crime*. Jung used it for revealing the presence of complexes unknown to the patient, but it may likewise be used in ascertaining what the subject knows and is consciously withholding. If a person is suspected of a certain crime, such as stealing a watch, an association experiment may be carried out in the following way: The experimenter prepares a list of words some of which pertain to the crime, and some of which have no significance in this connection. The significant words are interpolated among the insignificant ones. The test is then given in the usual manner. The guilt of the subject may be indicated in two ways. First, the time may be longer for the significant words; and secondly, the subject may give himself away by the nature of his response. This test has been used successfully on a number of occasions in the detection of crime, but it is, of course, not absolutely reliable. Similar variations in reaction may occur if the subject is innocent and is merely emotionally disturbed or afraid of being found guilty. The results of the test must therefore be interpreted with discretion.

The association test may likewise be used in establish-

ing an individual's personal identity. This may be illustrated by the following example. A few years ago a young man appeared in Toronto and told a remarkable story about his experiences and his identity. The gist of this story was that he came from the North Country where he had lived with his father, that he had never been in a town before, knew nothing of civilized life, and had never seen a train, a street car, a movie show, or even a woman until he left the North Country a few weeks previously. The case was featured in the press, and many attempts were made to ascertain the true history of the subject. In the end his identity was established by means of an association test.

The writer prepared a list of simple stimulus words, most of which would be well known in the North Country. The catchwords were such as had special significance in more civilized communities. In the test the boy gave associations to these catchwords that could only be given by one who had experienced ordinary American life. For example, to the word "base" his response was "home," indicating a knowledge of baseball; to the word "pal" his response was "buddy," indicating a knowledge of army terms particularly in the United States. Other significant responses were also given. From these it was inferred that the boy came from the United States and he was told that the results of the test indicated this. He confessed that he came from Cincinnati.

The Kent-Rosanoff test.—Kent and Rosanoff investigated the nature of the responses given to one hundred common stimulus words by one thousand subjects selected more or less at random from the general population.[3]

[3] G. H. Kent and A. J. Rosanoff, "A Study of Association in Insanity," *American Journal of Insanity*, 1910, 67.

They were particularly interested in the *community of ideas,* that is, in the frequency of the same response to any given stimulus word. They showed that the responses given to each stimulus word were rather limited in number, many of the subjects giving exactly the same response. For example, to the stimulus word "table," 267 out of the thousand subjects responded with "chair," 76 with "wood," 75 with "furniture," 63 with "eat," and 57 with "cloth," while other responses were of still less frequency. Similar results were obtained for each of the hundred stimulus words.

It was further found that some subjects were more likely to give common responses than others. The experimenters were therefore able to work out a *frequency index* for each subject. This is a measure of his tendency to give common responses. The more a subject tends to give the same responses as his fellows the higher his frequency index will be. It was found that patients suffering from mental diseases, particularly dementia præcox, had very low frequency indexes. At the same time persons who are merely eccentric and perhaps unusually ingenious have likewise low frequency indexes. At any rate, the occurrence of many rare and unusual responses in the association test is abnormal. Its exact significance is not quite clear but it may indicate eccentricity or genius as well as mental disease.

ABNORMALITIES OF IMAGES, IDEAS AND THEIR SEQUENCES

The more important abnormalities of images and ideas are those of degree. Images and ideas may be vague or lacking, or they may be extremely vivid. Abnormalities also occur in the sequence of images and ideas. A normal sequence depends upon the presence of associative ten-

dencies and upon a normal balance of neural facilitation and inhibition. Disturbance in the sequence of ideas may be traceable to abnormality of these factors or of the ideas themselves.

Abnormal imagery.—Deficiency of imagery may be general, involving all kinds of imagery, or specific, involving only some particular type. General deficiency or vagueness of imagery probably occurs in feeble-mindedness and in the dementias resulting from severe mental diseases. A relative deficiency is likewise characteristic of some persons of sound mental health. Such persons are usually dull, uninteresting, and prosaic. They are "the hewers of wood and drawers of water."

A person may have vivid images pertaining to one sense department and poor images pertaining to another. For instance, he may have vivid visual images together with exceedingly poor auditory images, and vice versa. Sometimes lack of a special kind of imagery may result from brain disease or injury involving some specific area of the cortex. The areas for imagery are presumably the same as the areas for sensation; and the neurological processes underlying imagery may be the same as those for sensation except that they are less intense, and are aroused by nerve currents coming from other cortical areas instead of from the sense organs.

Abnormally vivid imagery is usually specific, involving only some particular kind of images. This exceptional imagery may be the basis of special ability in a particular field, like art or music. It is said that Goethe could imagine an object so clearly that he could actually see it before him. In other words, he could voluntarily produce a hallucination. Extremely vivid imagery occurs in some forms of mental disease, particularly in the psycho-

neuroses; and it no doubt plays a part in the production of hallucinations.

A type of imagery called "eidetic imagery" has recently been described.[4] It has been found that many persons have very vivid visual images. If they imagine some object such as a vase on a table, the image is so clear that they cannot see through it. It is superimposed over other objects and blocks vision of them just as an actual perception would do. This is apparently the type of imagery Goethe possessed. It is now found to be relatively common among children. An eidetic image stands somewhere between an ordinary image and a hallucination. There is only a difference of degree between Goethe's vivid imagery and Martin Luther's hallucination when he threw his ink bottle at the devil.

Dearth of ideas.—Ideas like images may be exceptionally vivid or very hazy. They may also be deficient or excessive in number. Deficiency in number is called "dearth of ideas." It is found in feeble-minded persons because they lack the capacity to acquire ideas. It is likewise found in the dementia resulting from mental disease, because the patient has lost some of the ideas that were acquired. Moreover, a relative dearth of ideas occurs in illiterate persons and those who live in very restricted environments. Where there is dearth of ideas the conversation of the subject lacks variety—it is dull and monotonous.

Persistent ideas.—Persistent ideas involve abnormal fixation of attention, and absence of the usual sequence of thought. They are probably due to abnormal balance of neural inhibition and facilitation. Certain neural processes

[4] See Heinrich Klüver, "An Experimental Study of the Eidetic Type," *Genetic Psychology Monographs,* Vol. I (1926), No. 2.

are unusually facilitated, others are inhibited. The psychoanalysts have attempted to relate persistent ideas to repressed complexes. An idea of this kind is supposed to represent symbolically an unconscious interest or desire. This theory may help to explain persistent ideas, but it must be supplemented by a neurological account for adequate explanation.

The most common form of persistent idea is the *perseveration* of some meaningless phrase or melody, as often occurs during fatigue in everyday life. This form is probably dependent merely upon increased neural irritability. Sometimes persistent ideas have an obsessive nature. They besiege the mind and preëmpt the attention. These obsessive ideas are decidedly unpleasant. They may be classified into three different groups depending upon the attitude of the patient towards them. First, the patient may recognize the pathological character of the idea, and seek to consult a psychiatrist. In this case the obsession is called an *imperative idea*. Secondly, the patient may consider the idea as a normal expression of his personality. The idea harmonizes with other aspects of his mental life. This is called a *fixed idea*. Fixed ideas occur in mentally healthy persons as well as in the mentally diseased. Ambition and the desire for vengeance are fixed ideas in ordinary life. Thirdly, the patient may interpret the obsessing idea not as pathological but as due to some external influence. He regards it as forced upon him from without, perhaps by some malevolent being. This is called an *autochthonous idea*. It is usually indicative of serious mental disease.

Rosanoff gives the following illustrations of these three forms of obsessive ideas. A mother is haunted by the idea of killing her child whom she loves dearly. She can no

longer think of anything else, but she recognizes the idea as a morbid phenomenon and begs to be relieved of it. This is an imperative idea. A mother who has lost her child is convinced that if she had given him a certain kind of medicine he would not have died. The idea appears to her perfectly legitimate and natural. This is a fixed idea. A mother believes that her neighbor forces upon her the idea of killing her child. This is an autochthonous idea.[5]

Retardation of ideas.—This is a slowing down in the sequence of ideas, a lengthening of association time. It is characteristic of depressed states both in mental diseases and in everyday life. Some patients have described it as "thinking difficulty." There is decided slowness in the elaboration of ideas. If the patient is asked a question there may be a long interval before the response is initiated, and when it is initiated the words follow one another very slowly. This symptom is probably due to decreased neural irritability and conductivity, or perhaps to increased synaptic resistance.

Flight of ideas.—In flight of ideas the association time is not really accelerated as the term implies, but the sequence of thought is characterized by incessant changes in direction. These changes are determined by free association, and the more trivial or superficial associations are likely to predominate. In the talk of the patient there is an absence of "goal idea." In other words, the patient is not directing his thought towards any definite end as one does in ordinary conversation. Flight of ideas is characteristic of the manic phase of manic-depressive insanity and of all excited states. It also occurs in mild alcoholic intoxication and in the exalted and joyous moments of

[5] A. J. Rosanoff, *Manual of Psychiatry* (John Wiley, 1927), p 45.

everyday life. The following is an example of flight of ideas taken from the discourse of a manic patient:

"Now I want to be a nice, accommodating patient; anything from sewing on a button, mending a net, or scrubbing the floor, or making a bed. I am a jack-of-all-trades and master of none! [Laughs; notices nurse.] But I don't like women to wait on me when I am in bed; I am modest; this all goes because I want to get married again. Oh, I am quite a talker; I work for a New York talking-machine company. You are a physician, but I don't think you are much of a lawyer, are you? I demand that you send for a lawyer! I want him to take evidence. By God in Heaven, my Saviour, I will make somebody sweat! I worked by the sweat of my brow! [Notices money on the table.] A quarter; twenty-five cents. In God we trust; United States of America; Army and Navy forever!" [6]

Circumstantiality.—This is continual interruption of the train of thought by numerous digressions regarding inessential details. There is a "goal of thought," but it is reached by a very circuitous route. Circumstantiality is common among illiterate persons, and is familiar to every one who has been bored by a long-winded story-teller. Such story-tellers lack a normal sense of the relative values of their ideas. They lack proportion, and go into irrelevant details because all their ideas have the same value. Circumstantiality is somewhat characteristic of senility and is likewise a common symptom of epilepsy. James describes circumstantiality as "total recall" or "impartial redintegration." [7] The subject remembers too much; all the associated ideas are aroused. He illustrates it by the following passage from Jane Austen's *Emma:*

"But where could *you* hear it?" cried Miss Bates. "Where could you possibly hear it, Mr. Knightley? For it is not five

[6] *Ibid.*, p. 44.
[7] William James, *Psychology, Briefer Course,* pp. 259-261.

minutes since I received Mrs. Cole's note—no, it cannot be more than five—or at least ten—for I had got my bonnet and spencer on, just ready to come out—I was only gone down to speak to Patty again about the pork—Jane was standing in the passage—were not you, Jane?—for my mother was so afraid that we had not any salting-pan large enough. So I said I would go down and see, and Jane said: "shall I go down instead? for I think you have a little cold, and Patty has been washing the kitchen." "Oh, my dear," said I—well, and just then came the note. A Miss Hawkins—that's all I know—a Miss Hawkins, of Bath. But, Mr. Knightley, how could you possibly have heard it? for the very moment Mr. Cole told Mrs. Cole of it, she sat down and wrote to me. A Miss Hawkins—"

Incoherence.—In incoherence the ideas follow one another without any apparent connection. The associations are unusual and eccentric. Incoherence is dissociation of ideas, and is found in its most characteristic form in dementia præcox where it is accompanied by other symptoms of a more general dissociation. Incoherence does not often occur in healthy persons; but the sequence of ideas in fatigued states and in daydreams sometimes approximates the incoherence of dementia præcox. The following is an example of incoherent speech obtained from a case of dementia præcox.

"What liver and bacon is I don't know. You are a spare; the spare; that's all. It is Aunt Mary. Is it Aunt Mary? Would you look at the thing? What would you think? Cold cream. That's all. Well, I thought a comediata. Don't worry about a comediata. You write. He is writing. Shouldn't write. That's all. I'll bet you have a lump on your back. That's all. I looked out the window and I didn't know what underground announcements are. My husband had to take dogs for a fit of sickness." [8]

[8] Rosanoff, *op. cit.*, p. 44.

CHAPTER XVI

IMAGINATION AND THOUGHT

Jung has made an interesting distinction between undirected and directed thinking.[1] In the former, ideas follow one another without any feeling of effort or any conscious direction, as in daydreams and reveries. In the latter, the sequence of ideas seems to be consciously directed towards some goal, as in telling a story or solving a problem. This is practically the distinction between imagination and thought. The distinction is, of course, somewhat arbitrary, for thought contains undirected elements, that is, elements not relevant to the goal idea; while imagination, although consciously undirected, is nevertheless subconsciously determined. Both imagination and thought depend upon experience, memory, and the association of ideas.

Imagination.—The most typical examples of imagination are reveries or daydreams. But imagination is also interspersed in the more directed forms of thinking. A distinction may be made between *reproductive* and *creative* imagination. In the former the ideas are exact copies of past experiences although they are not given a definite past reference. In the latter new ideas appear in consciousness. The novelty of these ideas is, however, by no means complete. It consists in new combinations of previous experiences. For instance, the person who first

[1] C. G. Jung, *Psychology of the Unconscious,* Chap. I.

thought of a mermaid had a novel idea, but it is obviously only a new combination of ideas of two common objects, a woman and a fish. When any one now thinks of a mermaid, he has, of course, merely reproductive imagination; for he has previously seen pictures of mermaids or read of them.

All that is necessary for creative imagination is past experience and the ability to make new combinations. The more extensive the experience and the greater the combinative ability, the more creative will be the imagination. The acquisition of experience is dependent upon neural plasticity, and combinative ability is likewise a function of the brain. It is the capacity to combine neural patterns that have already been acquired.

Imagination is closely related to the affective and conative life. It is largely determined by feelings and impulses. These may take the form of conscious interests and aversions, but they just as often exist as unconscious drives and complexes. Imagination is thus generally of a wish-fulfilling nature. It satisfies certain desires and needs of the individual. It also extends the narrow bounds of physical experience and makes life less drab than it would otherwise be. For these reasons an active imagination may be of considerable therapeutic and prophylactic value. It may act as a "safety valve" permitting self-expression and preventing development of functional neuroses; and it could no doubt be trained to play this rôle more effectively. Many persons are deficient in imagination. We sometimes feel that such persons are to be pitied, but they are probably quite unconscious of their deficiency. They are, moreover, not usually the sensitive sort of people that are likely to develop psychoneuroses.

Phantasy.—This is excessive imagination such as occurs in the daydreams and castle-building of adolescence.

In some cases, particularly in childhood, vivid imagery may be actually confused with perceived reality. It is occasionally difficult even in adult life to distinguish between phantasy and reality, and in childhood it is more difficult since the distinction has not yet been learned. Children often create imaginary playmates or toys, and act as if they were real persons and objects. This accounts in part for so-called "children's lies." Likewise in certain mental diseases the patients may have vivid imagery which is mistaken for reality. This occurs in some forms of dementia præcox. The patients withdraw from contact with reality and seem to be entirely preoccupied with a world of their own creation.

Phantasies are rather obviously based upon affective and conative factors. They represent the fulfillment of repressed desires and impulses that are often of a childish nature. Some of the most common phantasies of childhood and adolescence are the "foster child phantasy," the "hero phantasy," and the "death phantasy." In the foster child phantasy the subject imagines that his supposed parents are not his real parents. They are merely guardians. His real parents are of superior if not noble lineage. This phantasy may be interpreted as a reaction against the prohibiting authority of the parents, and as a wish for superiority and importance. The hero phantasy is similar to the foster child phantasy. The subject usually imagines himself victor in a fight, which may be either physical or intellectual in nature. But he may also imagine himself coming to the rescue of some person in distress, and thus winning the praise of his friends and others. And again he may dream of achieving greatness in some specific undertaking.

In the death phantasy the subject imagines himself

already dead, and sees his friends weeping by his bier or following the hearse in a long procession to the cemetery. This phantasy is fairly obviously motivated by the desire for greater attention and consideration than is obtained in the humdrum course of life. In the castle-building phantasies of adolescence, sex wishes are also important motives along with the other instinctive drives. Phantasies are closely related to dreams as well as to the hallucinations and delusions of the insane, and the explanation of any one of these phenomena will throw light upon the others. Perhaps children who show a marked tendency to such excessive forms of imagination should be encouraged to bring themselves more into contact with reality and to cultivate thought rather than imagination.

Judgment.—Thought differs from imagination in the apparent conscious direction and selection of the ideas. Thought may be discussed under two headings, namely, judgment and reasoning. Judgment is often defined in logic as "reference of a particular idea to a general concept," such as bringing a species under a genus or family. It has also been defined as "ascription of meaning" to any given experience. Ascription of meaning may be analyzed further into arousal of associated images and ideas. Judgment is thus analogous to perception. The difference is that in perception there is no conscious selection of the associated ideas. Certain particular ideas are firmly connected with the sensory experience. In judgment many ideas are loosely connected with the experience, and a process of selection or choice of ideas takes place.

The difference between judgment and perception may be illustrated by comparing the observation of a well-known object with that of an unknown one. For example,

an ordinary house fly is perceived immediately whenever the stimulus is present. If it is seen, the visual sensations immediately arouse the associations that go to make up the perception of a fly. These include the auditory image of the buzz, tactual images of touch and tickle, the word-image "fly," ideas of the anatomical features and disagreeable habits of flies, and so forth. These associations are firmly connected with the sensations, and the object is at once perceived as a common house fly. On the other hand, if a strange insect is observed, it is at first perceived merely as a small object, or as belonging to the class, insect. Numerous additional associations then arise, some perhaps pertaining to one class of insects and some to another. Certain of these associations persist while others fade away. This is the process of judgment which terminates when the object is brought into relation with relevant past experience and definitely classified.

Judgment may be further illustrated by a student's mental processes in answering an examination question. These processes involve the arousal of associated ideas, the rejection of certain ideas, and the selection of others. Another illustration is the process of identifying unicellular organisms under the microscope. If the identification is complete and immediate, the mental process is perception; if not, judgment is involved. Judgment is also involved in deciding on a course of action. Here the process is the same. Various associated ideas pertaining to the different possibilities are aroused. Many of these ideas are immediately discarded, but some persist and affect the final choice.

Judgment depends in part upon knowledge and other cognitive experience, but in greater measure upon affective factors and impulses, like interests and aversions, loves

and hates. In the first place, the ideas which are aroused by association in the process of judgment depend upon feeling and emotion as well as upon cognitive factors. It was pointed out in the last chapter not only that such ideas are determined by frequency, recency, and vividness, but also that they must fit in with the feelings and interests of the moment. Secondly, the process of selection in judgment is likewise dependent upon affects and impulses, such as dominant interests and sentiments. Thus affective and conative factors play an important rôle in judgment, a rôle which is perhaps especially obvious in judgments regarding a future course of action. Judgment is closely related to belief and doubt. If only harmonious associations are aroused, judgment is easy and belief follows; while if incompatible associations are aroused, the process of selection is difficult and there result indecision and doubt. Belief and doubt will be further analyzed in the following chapter.

Abnormal judgment.—Abnormal judgment occurs as poor judgment, exceptionally good judgment, indecision, and false judgment. *Poor judgment* is due to lack of knowledge and experience; the associated ideas are inadequate and insufficient. Thus, poor judgment in general is characteristic of childhood, and of feeble-minded persons; while poor judgment in some particular field is common to all persons, and is due merely to lack of knowledge of the special topics involved. For instance, an exceedingly good physician may have very poor judgment in business matters. On the other hand, *exceptionally good judgment* depends upon extensive knowledge and experience in the specific field concerned. A physician has far better judgment than a business man in medical matters.

Indecision is due to the arousal of incompatible asso-

ciations and the presence of antagonistic impulses and feelings. These feelings, interests, or aversions are so balanced that rejection or selection of ideas is difficult, and therefore judgment is blocked or suspended. This is the indecision of the psychasthenic. On the other hand, indecision is sometimes due to breadth of knowledge and multiplicity of interests. The subject sees all sides of a question, recognizes their relative merits, and is thus unable to come to a decision. The practical man of quick decision is often one who lacks the knowledge and understanding that would hold judgment in abeyance. For example, the medical man who knows only a little but knows it well is often a more successful practitioner than the one who has a much higher degree of scholarship. The latter may fail to act because he sees the advantages and disadvantages of all therapeutic procedures.

False judgment is a result of selection of inappropriate associations. This may be due to lack of knowledge, as when a student makes a wrong classification of a specimen, or gives a wrong answer to an examination question. It is, however, more frequently due to the influence of some dominant interest or aversion. These feelings determine the selection of the wrong associations for that particular situation. In other words, the subject is prejudiced. A prejudiced person rejects all ideas not in conformity with his prejudice, and can therefore see only one side of a question.

Political or religious prejudices often make it quite impossible for apparently able men to make accurate judgments on certain topics. Even among scientists such emotional prejudices are not infrequent, and may lead to false or hasty judgments, especially on hypothetical questions. For example, some are prejudiced in favor of heredity,

others in favor of environment in accounting for human behavior, and neither one can see the arguments on the other side. Some are prejudiced against women in science or medicine, and are consequently unable to see their merits in these fields. Moreover, almost all scientists believe in the special importance of their own science for human welfare and social progress. All such judgments and beliefs are determined by feelings, emotions, and instincts rather than by knowledge or general information.

Reasoning.—Reasoning is essentially a series of judgments. In formal logic these judgments are arranged in various ways and given special names, as major premise, minor premise, and conclusion. Sometimes the judgments move from the general to the particular, from theory to fact. This is called deductive reasoning. Sometimes the judgments go from particular facts to more general statements or theories. This is inductive reasoning. Formal logic and mathematics teach us how to arrange our judgments in order to avoid fallacies in reasoning and arrive at correct conclusions. These various arrangements will not be described here.

The practical reasoning of everyday life usually takes the form of a series of unexpressed judgments followed by one which is overtly expressed. Reasoning may be described as a process of *trial and error in thought*. In discussing habit formation, the trial and error behavior of a cat in first attempting to escape from a box was described. A human being in a similar situation might reason. In other words, he might not overtly express all the unsuccessful attempts. He might stand perfectly still and perform them in his imagination. Then only the final trial which he thinks will be successful is actually expressed in behavior.

Similarly, in solving a mechanical puzzle a person may actually make random attempts until he finally hits upon the successful one; or he may imagine each of these trials, visualize its outcome, and then actually perform only the successful one. The former is called a "trial and error method." The latter is called a "rational method," but it is likewise really trial and error in thought. A very good illustration of the psychology of reasoning is the mental processes in a game of checkers or chess. The player imagines many moves and their consequences before he finally selects the move he actually makes. Reasoning in mathematics is also of a similar nature. Ideas are called up in relation to the problem, their consequences foreseen, and then they are either accepted or discarded. The reasoning process is ordinarily assisted by placing the temporarily accepted symbols upon paper for an actual tryout.

Reasoning is based upon judgment, and is therefore like judgment dependent partly upon knowledge and partly upon affects and impulses. In practical life our knowledge, interests and aversions usually determine our conclusions quite apart from reasoning. Reasoning is then made use of in order to make these conclusions seem rational and therefore more acceptable both to ourselves and to our fellow men. Thus reasoning follows rather than precedes belief or conduct; it is an *ex post facto* process. Perhaps only in mathematical reasoning do we believe a conclusion because it follows logically from the premises. In ordinary life we believe or act first, and invent our proofs and reasons afterwards. These proofs and reasons may sometimes be correct, but they are just as often mere rationalizations that serve to conceal our true motives.

Fallacies may occur in the process of reasoning as a result of errors in the sequence or arrangement of judgments. These fallacies can be corrected by a study of formal logic or mathematics. The various kinds of logical fallacies need not be described here. Psychologically, the most common and significant fallacies in reasoning occur in the formation of judgments rather than in logical deduction from them. In other words, the premises in reasoning are false to begin with. False premises may be due to ignorance or to prejudice as previously mentioned. Training in logic or mathematics would not correct this form of error. It is too deeply grounded in our psychological nature.

Rationalization.—This means giving plausible or specious reasons for belief or conduct. These reasons are not, however, the true motives but rather serve to conceal them. Moreover, the subject himself is not aware or only dimly aware of the true motives. Rationalization is thus distinguished from plain lying. An external observer may be better aware of the true motives than the subject himself. They are usually less virtuous than the professed motives, and the subject keeps them out of consciousness for fear of thinking badly of himself. Rationalization is thus "psychological camouflage." It serves to protect us against the criticism of ourselves as well as of society when our true motives are not readily acceptable. A rationalization usually contains some element of truth, but this element is exaggerated and the more important truth concealed.

Some rationalization is probably necessary for the maintenance of a social organization. Society could scarcely last if individuals knew and frankly acknowledged the true motives of their beliefs and actions. We are

thus taught to rationalize from the beginning. The child who is tardy for school and tells the teacher that his parents overslept, or that he was detained by morning chores is probably rationalizing. He may be late because he dislikes school in general, and the teacher in particular, and has therefore loitered along the way. But he could scarcely tell this to the teacher with impunity. So he learns to rationalize at an early age and continues rationalizing throughout life.

It is probably always rationalization when we excuse ourselves from an appointment because of lack of time. We all have time for what we want to do most. It is, however, more acceptable socially to say that we have no time than to say we are more interested in something else. Even professional people often rationalize their pet beliefs and favorite practices. For instance, physicians have been known to argue that anesthetics should not be used in childbirth or in operations because pain is God-given and good for the soul. This is a rather obvious rationalization which no doubt cloaks a sadistic impulse to inflict pain and witness suffering. It is a question whether there is any reasoning outside of mathematics and formal logic that is not rationalizing. Whenever our actions or beliefs are determined by primitive drives, emotional factors, special interests or prejudices we are almost certain to give some other more rational motive for them. We thus bolster up our fondest delusion that "man is a rational animal."

Rationalization is thus common in mental health. It also appears in very exaggerated and obvious forms in certain mental diseases. Whenever a patient has a false belief and yet retains some intellectual ability, rationalization is evident. The best examples are found in the delusions of paranoia. The patient often has a false belief of his special

importance which he supports with a whole system of logical reasoning. Delusions whether of healthy persons or of the mentally diseased are always rationalized. Some of these delusions will be described in the following chapter.

CHAPTER XVII

BELIEF AND DOUBT

Belief is the acceptance of a judgment or proposition. The judgment may pertain to the reality of facts, the validity of theories, the truth of philosophical or theological systems, the integrity of political parties, or the justice of a cause. *Disbelief* is a form of belief; it is the rejection of such a judgment or the acceptance of an opposite judgment. The psychological account of belief and disbelief is the same, for the factors that determine acceptance and rejection are the same.

Acceptance or rejection of a judgment is determined partly by special knowledge or general information, and partly by affective and conative factors. Knowledge and information are represented in consciousness as associated ideas. Acceptance or rejection will readily occur if these ideas are few in number, or if they are compatible with each other. The affects and impulses that determine belief or disbelief are such processes as interests and aversions, loves and hates, and in general all feelings, emotions, and instinctive or habitual drives. The acceptance or rejection of a judgment will occur if these affective and conative processes are not mutually antagonistic, if the feelings and impulses all tend in the same direction.

Belief or disbelief is thus determined by absence of conflicting ideas, affects, and impulses. Absence of conflicting ideas may be due to lack of knowledge, that is, "dearth of ideas," or to complete knowledge which em-

braces and harmonizes the apparently incompatible elements. Absence of conflicting affects and impulses may be due to narrowness of personal interests or to repression of the opposite feelings and impulses. In other words, the feelings and impulses may be limited in number, or the antagonistic ones may be kept out of mind. Furthermore, absence of conflict may result from a harmonizing of the affects and impulses under a major drive. Thus the divergent tendencies are organized and made subservient to some dominant tendency. In its dependence upon emotion and instinctive impulse, belief may be regarded as the expression of a fundamental need.[1] This need may be subjectively experienced as a wish or desire, and objectively described as a biological trend. Psychoanalysis has emphasized the wish-fulfilling character of belief.

Kinds of belief.—Belief (or disbelief) may thus depend upon a number of causes, and it is consequently possible to distinguish and classify different kinds of belief by referring to their chief causative factors. In this way four main types of belief may be differentiated; namely, pristine confidence, unquestioning credence, practical certainty, and intellectual conviction.[2]

Pristine confidence is a form of belief which is determined chiefly by feelings, emotions and impulses. It is the belief of the child, illustrated by his implicit confidence in the goodness and greatness of his parents. But it is likewise common among adults, where it is often quite obviously determined by the wish to believe, as in the wide-spread belief in telepathy and spirit communication.

[1] C. Macfie Campbell, *Delusion and Belief* (Harvard University Press, 1926).

[2] This classification of beliefs is adapted from one proposed by Dr. Kingston in a dissertation for the doctorate degree at the University of Toronto.

Pristine confidence is usually found wherever there are special interests. For instance, army officers believe in preparation for war; and most people believe in the merits of their own political system, in the beauty of their own country, in the healthfulness of its climate, and so forth. This form of belief also occurs wherever there are emotional prejudices. Thus the Nordic believes in the superiority of his own race, and people in general accept and defend familiar or prevailing customs. Pristine confidence is more likely to be false than true, and the majority of our delusions belong to this class of belief.

Unquestioning credence is belief determined chiefly by perception. We all tend to believe in the validity of our own sensory experience, as is indicated by the frequently quoted remark, "seeing is believing." It would, of course, be equally plausible to regard hearing, touching, or any other kind of sensory experience as sufficient evidence for believing. Unquestioning credence is frequently false, because perception itself may be false or inaccurate. This may be illustrated by the primitive belief that the sun moves around the earth, and by the belief in ghosts because one has seen them. Further knowledge makes us less credulous of our sensory experiences. Thus a real modern "doubting Thomas" would also doubt the evidence of his own senses.

Practical certainty is belief determined chiefly by practical experience. Here the criterion of belief is pragmatic, a thing is believed because "it works." Practical certainty may be illustrated by belief in certain hypotheses in science, by belief in special methods in business, and by belief in the efficacy of prescriptions or other therapeutic procedures in medicine. Such beliefs are usually based upon practical experience, and they may all be

false. In science, hypotheses that have been held for a long time are finally proved erroneous. In medicine, therapeutic procedures are changed and medical men may wonder how patients ever recovered under the old treatment. In business, new methods are adopted and found more satisfactory than the old ones.

Business men sometimes believe in phrenological and physiognomical methods of selecting their employees, because such methods work. Further experience, however, might show that any other method would work just as well. Perhaps the pseudoscientific methods appear to work merely because the employer has developed an interest in the personalities of his employees. This interest influences his selection and treatment of them and thus indirectly affects the labor turnover. Farmers often believe that their crops should be sown and reaped at certain phases of the moon, and they feel that the belief is substantiated by practical experience. The frequent incorrectness of this form of belief is due to the fact that it is difficult to know whether a thing actually does work, and still more difficult to know *why* it works. It may work for some totally different reason from the one supposed.

Intellectual conviction is belief determined chiefly by knowledge or cognitive experience. It is belief arrived at as a result of an unbiased weighing of the "pros and cons." It is thus the belief of the scholar and the scientist in the facts and theories of his own particular field. In so far as a scientist is biased by feeling and desire, his belief also partakes of the nature of pristine confidence. Real intellectual conviction is less likely to be false than other forms of belief, but it, too, may be erroneous. Many examples of false beliefs may be found in the history of science, such as belief in the Ptolemaic system of as-

tronomy, in alchemy, and in phrenology. Scientists of the present day have, no doubt, similar false beliefs which will ultimately be corrected by the further advancement of knowledge. It is, of course, rare to find a scientist who is not influenced somewhat by his emotional prejudices and desires, even in scientific beliefs pertaining to his own field. Intellectual conviction is thus an ideal form of belief which we may aim to approximate but seldom achieve. It is probable that it is only really attained in mathematics and pure science.

Many beliefs are *mixed beliefs* in the sense that they are determined by all or a number of the foregoing factors. For example, the belief of the bacteriologist in the special importance of his science for human welfare is no doubt a mixed belief. It is in part pristine confidence—he is influenced by his special interests and desires. It is in part unquestioning credence—he has seen much under the microscope and accepts the evidence of his senses. It is in part practical certainty—he has compared hygienic and unsanitary methods of living. It is in part intellectual conviction—he has weighed the evidence obtained by study and by laboratory investigation. A similar analysis might be made of the belief of any scientist in the special importance of his own subject.

Doubt.—Doubt and not disbelief is the true antithesis of belief. Doubt may be due to conflicting or incompatible ideas. This may be illustrated by the agnosticism of the scientist with reference to metaphysical problems, and with reference to scientific problems before the evidence is all in. Doubt may also be due to mutually antagonistic feelings or impulses pertaining to any particular question or situation. A person may have an interest in, and an aversion towards the same subject, and consequently

may be influenced now by one tendency and now by another.

Scepticism, or the tendency to doubt, may thus be a result of unusual breadth of knowledge. The doubting person sees all the different aspects of any problem and is conscious of the merits of each aspect. The tendency to doubt may also be a result of multiplicity of interests, some of which pertain to different aspects of the same problem and are antagonistic. On the other hand, the man who believes readily and decides quickly may be narrow in his general perspective. He may have too few ideas and interests to inhibit belief.

It is a truism that the essential things of life, routine performances, should be made as automatic as possible so that the mind can be set free for other problems. Doubt and indecision regarding such matters greatly reduce a person's general efficiency, and handicap him in his daily work. These doubts are, however, of frequent occurrence especially in neurotic persons and in others when they are fatigued or ill. Sometimes the doubts become real obsessions. The individual may continually question the evidence of his own senses or the motives of his friends, and may even doubt the reality of an external world or of his own existence. Obsessing doubts are particularly characteristic of psychasthenia. Doubt which is based upon conflicting feelings and impulses is a form of anxiety. It is thus unpleasant and mentally unhealthy. On the other hand, doubt which is due merely to incompatible ideas and involves no conflict of personal interests is not unhealthy. It is the chronic state of mind of the thinker.

Delusion.—Delusion is false belief, and must not be confused with illusion, which is a kind of false perception. Delusions may be *normal* or *abnormal*. All persons may

have the same delusion, as for example when every one believed that the earth was the center of the universe. Many of our present scientific and popular views may likewise turn out to be universal delusions. Furthermore, nearly every person has some special delusions of his own. He may believe in his own importance, or that he has a special mission on earth. Such a delusion is probably an overcompensation for a feeling of inferiority and incompetence. Again he may be suspicious and always believe that people are trying to do him injury; or he may have the delusion that he is a "Beau Brummel," a woman-killer, or a poet. Delusions may be the result of ignorance but, like belief in general, they are more frequently based upon feelings and instinctive drives.

Abnormal delusions are merely those that occur less frequently and are somewhat out of the ordinary; they are the beliefs of "cranks," freaks, fanatics and other eccentric persons. Some "cranks" believe in "perpetual motion" and are always trying to invent and patent curious but useless machines, others believe in palmistry or equally absurd forms of fortune-telling, and still others advocate special kinds of social reform. Many people belong to what Münsterberg has called "the intellectual underworld." [3] They advocate and perhaps build up very remarkable systems of pseudoscience such as astrology, phrenology, and Christian Science. Books written by members of this intellectual underworld may be found in most libraries and some of them are all too readily accepted by the gullible public. The writer has on his desk at the moment two such books. One is a remarkable system of cosmology, explaining everything in the universe

[3] Hugo Münsterberg, *Psychology and Social Sanity* (Doubleday, Page, 1914).

in terms of vibration. The other attempts to deduce a whole system of philosophy, ethics and even mathematics from one fundamental fact, which is that "mates must love each other unselfishly."

The writer has also an interesting manuscript written by a would-be psychologist who has worked out a remarkable theory of emotions. This theory is quite involved and goes into many intricate details regarding emotion. The essential point, however, is that every emotion is dependent upon a muscle in the trachea or thoracic cavity. Each of these muscles has ten different degrees of contraction, and likewise each emotion has ten degrees of intensity. The author of the manuscript believes that he possesses voluntary control over these muscles, and that other persons can cultivate similar control. He will demonstrate this control on request by commanding a particular muscle to contract to some particular degree. For instance, he will say "fear muscle contract to the fifth degree," and at once he will exhibit the characteristic expressions of fear at medium intensity.

Such scientific or philosophical systems usually present a superficial appearance of logic which is easily broken down on critical analysis. They are merely extensive rationalizations of absurd and emotionally determined beliefs. However, it must in fairness be admitted that a similar type of belief and rationalization may be found among real scientists, "the intellectual élite." This may be illustrated by the argument of an economic entomologist that insects will destroy the human race unless his services are used to combat them, and by the belief of certain psychologists that intelligence tests are the great panacea for educational and social ills.

Delusions in mental disease.—These are merely

more exaggerated forms of the delusions already considered. They, like other delusions, may present a coherent and logical appearance, in which case they are called *systematized delusions*. They sometimes appear so rational that they may be mistaken for truth by an uninitiated observer. These delusions are characteristic of paranoia and of any paranoid diseases in which there is not much intellectual deterioration. The delusions in mental disease are, however, more frequently *unsystematized,* that is, disconnected and not logically related to the other mental processes of the patient. Delusions of this kind are found in general paralysis of the insane, and in other deteriorating psychoses. The patient may tell you that he has millions of dollars, or thousands of automobiles, or that he owns the hospital; and yet he may continue to polish the floor or perform some other menial task quite submissively. Systematized delusions are usually more or less *permanent,* they remain the same from day to day; while unsystematized delusions are *changeable,* the patient may give expression to a new delusion every time he is seen.

Delusions are sometimes classified as *endogenous* and *exogenous*. An endogenous delusion is one that is closely related to the whole personality of the patient, in fact, it seems like a further development or unfolding of his personality. Thus a person, who has always been suspicious or conceited, may on becoming mentally diseased develop a delusion of persecution or of grandeur. An exogenous delusion seems to be engrafted upon the personality, and has no apparent connection with it. It does not seem just like the person in question to have such a delusion. Moreover, if the patient recovers he cannot understand how he could have believed the things he did. The delusions that

occasionally occur in fever delirium belong to this category.

Delusions may refer to the self or to the environment. Those that refer to the outside world or to other persons are called *allopsychic* delusions. The delusion of persecution belongs here. Those that refer to the self may be *somatopsychic,* referring to the body, or *autopsychic,* referring to the psychological personality. The former may be illustrated by the delusion that there is something wrong with the physical organs, such as that the stomach is absent, the bowels dead, or the heart displaced. The latter may be illustrated by the delusion of grandeur, and by the delusion of sinfulness and guilt.

Delusions are manifold and varied in their *content.* In melancholy and depressed states they are colored by the feeling tone. The patient may believe that he is very wicked or has committed a terrible crime. He may say he has committed an "unpardonable sin," but he is unable to give any details as to the nature of the supposed sin. This delusion may represent an unconscious attempt to account for misery and depression. Even normal people are prone to assume that suffering is "the wages of sin." This is a rationalization of unpleasant and despondent feelings. Somewhat similar, and probably accounted for in the same way, are the delusions of *ruin* and *negation* characteristic of senility and senile dementia. The patient believes he is bereft, has no means of support and must surely go to the poorhouse. Sometimes the delusions have a *hypochondriacal* nature. The patient believes he is physically diseased, or even that certain organs of the body are absent. He has no heart, no stomach, or no brain.

Delusions of *persecution* are common in certain mental diseases. The patient may believe that the whole world

is against him, or that some secret society or particular individual is trying to do him injury. Such delusions have a social or legal significance; for the patient may persecute and perhaps injure his supposed persecutors, or he may seek legal redress for his supposed wrongs. In their milder degree, delusions of persecution may take the form of delusions of *reference*. The patient misinterprets ordinary occurrences in his environment as referring to himself. He imagines people are staring at him, laughing at him, or talking about him. Delusions of *jealousy* are analogous to delusions of persecution. A patient believes that his wife or sweetheart is unfaithful, and he misinterprets even the most insignificant actions as evidences of this infidelity.

Delusions of persecution and infidelity are in part due to projection. This means the ascription of one's own vices to other persons. The patient who believes the world is against him is really a misanthrope, against the world; and a person that has a delusion of infidelity is really himself unfaithful at heart. Thus the fundamental disorder is the antisocial feelings and attitudes of the patient.

Another group of false beliefs common in mental disease are the delusions of *grandeur*. The patient believes in his own superiority. He may imagine himself extremely wealthy, or he may believe that he is descended from nobility, royalty, or even from God himself. Delusions of grandeur may be interpreted as overcompensations for original feelings of inferiority or inadequacy.[4] They are at the same time rather obvious fulfillments of certain childish wishes and phantasies. These wishes are mani-

[4] T. H. Haines, "The Genesis of a Paranoic State," *Journal of Abnormal Psychology*, 11 (1917), 368-395.

fested when the powers of inhibition are removed as a result of mental disease or in other ways. Delusions of grandeur like delusions of persecution are frequently found in the absence of any marked mental deterioration, and in this case they are so highly organized and so logically presented that other persons may be quite convinced of their truth.

Delusions of grandeur may take various forms. Sometimes they are *inventive* delusions, and the patient besieges patent offices with his many useless devices. Sometimes they are *religious* delusions, and the patient develops some original but usually fantastic religious system. Such delusions no doubt account in part for many would-be religious leaders, and for the origin of some peculiar religious sects. Very similar are the *reformatory* delusions. The patient has some pet scheme for the reformation of society. These delusions are exemplified by many street corner and soapbox orators. Sometimes the delusions are of an erotic or *amorous* nature. A male patient may believe that some woman, usually of higher social status than himself, is enamored of him. He persistently inflicts his attentions upon her and may misinterpret her failure to recognize his advances as necessitated by the social situation. He simply cannot be turned down.

The delusions of mental disease are explained in the same way as the normal delusions and beliefs in mental health. They are based upon feelings, emotions, and instincts, and therefore cannot be changed by appeal to reason. The only possibility of correcting them is to influence and change these more fundamental affective and impulsive factors. Reason is the handmaiden of the emotions and instincts, and will always come to their service. Hence,

to correct a delusion these emotional and instinctive drives must first be changed.

According to Kraepelin, psychotic delusions originate in emotional disturbances, clouding of consciousness, or mental deterioration.[5] It is probable that these factors merely remove normal inhibitions and thus permit primitive and infantile habits of thought and childish phantasies and wishes to express or assert themselves. Some of these phantasies and wishes have already been described. Southard has produced evidence to show that somatopsychic delusions are usually correlated with actual bodily disorder, and are therefore in part true.[6] The patient merely misinterprets the nature of the disorder. Similarly, there may be some basis in fact for other forms of delusion, and the fallacy may lie in the incorrect appreciation of the relative importance of the various factors.

[5] Emil Kraepelin, *Psychiatrie* (Leipzig, 1909), Bd. I.

[6] E. E. Southard, "On the Somatic Sources of Somatic Delusions," *Journal of Abnormal Psychology*, 7 (1912), 326-339.

CHAPTER XVIII

IMITATION, SUGGESTION, AND HYPNOSIS

Imitation.—This is the act of copying the behavior of another person or the movement of an object. It may be intentional, unintentional, or even unconscious. *Intentional imitation* is the conscious endeavor to achieve an accepted standard of skill, social behavior, or general conduct. For example, in learning a foreign language the pupil tries to acquire the accent and pronunciation of his teacher. This he does by a series of trials which more and more closely approximate the standard. A similar method may be adopted in the acquisition of any habit of skill, or any form of social behavior. In each case the subject sets up the behavior of other persons as a pattern or model which he attempts to attain. Traits of character and temperament may be copied in the same way. In the hero worship of adolescence, the youth emulates the behavior patterns and temperamental characteristics of his ideal hero.

Unintentional imitation is copying behavior or movement without wishing to do so, or perhaps even in opposition to desire. The infant in its crib will sometimes smile in response to a smile, and similarly an adult tends to laugh when others laugh even though he may see no cause for laughter. Any instinctive response is likely to be imitated in the same manner. Social customs and manners are also for the most part adopted in this way. A person will unintentionally and even against his will gradually

pick up the accent of the people among whom he lives. For example, an Englishman living in America may gradually acquire an American accent and pattern of behavior in direct opposition to his wishes. On returning to England he may be astonished to find how greatly he has changed in these respects. Thus unintentional imitation may sometimes be quite *unconscious*. The subject does not know what is happening, and he may never know he has acquired new behavior patterns unless his attention is specially directed towards them.

Imitation is thus a factor of considerable importance in education. But it is not possible to acquire *simple* behavior responses merely by imitation. A person cannot learn to make a response that he has not already made, merely by watching some one else do it. Simple responses and acts of skill can only be learned in accordance with the principles already discussed in Chapter XII, "Habit and Learning." At the beginning there is a process of trial and error with chance success. The successful response is stamped in by repetition, satisfaction, and so forth. The learning process may, however, be facilitated by having a definite pattern or standard to imitate. This may be illustrated by a child learning to speak, as well as by an adult learning a foreign language. Every approximation to the standard will give satisfaction, while each departure from it will result in displeasure; and these affective responses influence the learning process as already described.

Moreover, it should be added that from the social point of view imitation remains of very great significance even though the simple behavior responses cannot be learned directly by imitation. For a person's behavior may not only be a model which others can emulate, but it may also

suggest to others the performance of similar behavior responses already acquired. Thus, a person may learn to smoke cigarettes by imitation; because he has already learned in other connections all the responses involved in smoking a cigarette, namely, picking one up, putting it in his mouth, lighting a match, sucking, and so on. Seeing others smoking cigarettes suggests the performance of these responses in a definite sequence, and in a particular social situation. It is only the simpler coördinations and acts of skill that cannot be learned by imitation.

Sympathy.—Sympathy is imitation of feelings and emotions; and it is always unintentional imitation. We are likely to be afraid when others are afraid, angry when others are angry, depressed when others are depressed, excited when others are excited, and so forth. It is well known that the morale of an organization is dependent more or less upon the spontaneous spread of feelings through imitation. Any kind of feeling or emotion whether pleasant or unpleasant may be imitated. Sympathy merely means "feeling with" others, feeling happy when they are happy, or sad when they are sad.

Sympathy, as the term is used in psychology, does not include the desire to help a person in distress. It is thus distinguished from pity which is more complex. *Pity* includes not only sympathetically aroused feelings in distressing situations but also the desire to help and protect. This desire is probably based upon the parental instinct. One may sympathize with a suffering person without having any marked impulse to attempt to do anything to alleviate his misery. Indeed, the strongest tendency might be to hasten away from the distressing scene. But if one has pity, he will wish to remain and do what he can for the sufferer.

Suggestion.—The term "suggestion" is applied to a stimulus rather than to a reaction. But a suggestion is a stimulus which leads to a particular kind of response. It produces an unintentional or a dissociated response. Such a stimulus may take various forms. It may be a mechanical movement, a gesture, or a more complex behavior pattern, which is imitated by the subject. But all imitation is not reaction to suggestion. Only unintentional imitation falls into this category. Sympathetic responses since they are always unintentional may be regarded as always reactions to suggestion. Intentional imitation is a more or less integrated response of the total personality and consequently is not determined by suggestion alone.

The stimulus in suggestion may also be a *verbal* one. It may be a statement or proposition, which results in belief or in action. But all belief or action resulting from verbal statements is not due to suggestion. Belief or action is due to suggestion only if the proposition or statement is uncritically accepted, that is, if it results in inhibition or dissociation of the critical powers or processes. For example, if a person is given a "tip" on the stock market and immediately accepts and acts upon it without further inquiry, his belief and action are determined by suggestion. On the other hand, if he inquires into the history and organization of the company concerned, and after careful consideration finally invests in the stock, his behavior is not necessarily determined by suggestion. It may be the outcome of a critical evaluation involving all the important mental processes of the individual.

A suggestion is thus *a stimulus which produces a piecemeal or partial response*. It effectively inhibits or dissociates certain mental processes. Hence the total personality is not involved in the response. For instance, whenever a

person buys an article and later regrets it, the purchase was probably determined by the suggestions of the salesman. The regret implies that at the time all the factors involved were not duly considered. The buying was merely a response of part of the personality—the other part was at the time in abeyance. On the other hand, if one buys an article from an expert salesman who uses all the persuasiveness in his power, the purchase is not the result of suggestion if the buyer critically evaluates the arguments, and weighs the "pros and cons." In such a case he is not likely to regret the purchase.

In order to avoid influence by suggestion in buying, it is a good rule never to make a final decision in the presence of the salesman. Decision should be postponed to allow time for quiet consideration. Opposing ideas and interests inhibited by the salesman's suggestions may thus have an opportunity of coming to the front. The aspects of the personality inhibited by suggestion are mainly intellectual processes, and the response is therefore largely dependent upon affective and conative factors. Suggestion inhibits the critical powers and appeals directly to the feelings, impulses and personal interests.

A suggestion is more effective if it is *indirectly presented*. This may be done in a number of ways. The suggestion may be implied in the language used rather than baldly stated. This is the method used in the so-called "leading questions" sometimes asked by lawyers in the courts of law. The answer is suggested by the form of the question. Another method is to present the suggestion in the margin of consciousness rather than in the focus of attention. In this way the critical faculties are more easily evaded. The unintentional acquisition of social habits and accent is chiefly dependent upon the constant

presence of marginal suggestions. A similar method is to give the suggestions when the subject is in a state of fatigue, drowsiness, or even sleep. The suggestions given in the dispersed attention of drowsiness are particularly effective, and this method is frequently used in suggestive therapeutics.

Suggestions are also more effective if they are *frequently repeated.* In fact they then become almost irresistible. This may be illustrated by the unwilling adoption of the accent of a particular locality. Similarly, a suggestion is more effective if it is given by many persons. It is difficult to resist the suggestive influence of a mob, a crowd, or of society in general. For example, during the Great War even some of the most intelligent persons in America were finally led to believe in "German atrocities" and in "making the world safe for democracy." Suggestion is also more effective if it comes from a person of eminence or one who is greatly respected. This is called "prestige suggestion." In debates the appeal to authority even among students and scholars is usually a most convincing argument; and in psychotherapeutic suggestion the prestige of the physician is a most important factor for success.

Suggestibility.—Suggestibility is susceptibility to suggestion, that is, liability to be influenced by suggestion. It therefore means the tendency to give unintentional, dissociated or piece-meal responses to certain stimuli and on certain occasions. Suggestibility from another point of view is a tendency towards inhibition of the critical processes. It may also be regarded as a predisposition to dissociation. All these various definitions merely express different aspects of the phenomenon.

Contrasuggestibility is usually regarded as the oppo-

site of suggestibility; but it is really a form of suggestibility. It is true that the subject's response is in direct opposition to the suggestion, but it is nevertheless a partial or dissociated reaction and not an integrated response involving the entire personality. The critical acumen or perspicacity is inhibited, and the personality is to that extent dissociated. Extreme contrasuggestibility is called "negativism." The negative person opposes every suggestion even when it is obviously against his interests to do so.

Contrasuggestibility may be, in part, an overcompensation for suggestibility. The subject is striving to defend himself against a strong tendency to submit or succumb to suggestions. It may also be due to a habit of opposition, formed in early life and never outgrown. Contrasuggestibility accounts for some forms of stubbornness. Other forms are merely expressions of self-assertion and involve the total personality to a greater extent. This is particularly true of the stubbornness of children. At certain stages of development a child asserts himself in his relations with other persons instead of taking a submissive attitude. This is a form of stubbornness, but not necessarily contrasuggestibility.

The suggestibility of a person varies greatly under different conditions or in different situations. It varies with his self-assertion and *submission*. A person is likely to be self-assertive in the presence of inferiors, and submissive in the presence of superiors. The greater his submissiveness, the more suggestible he becomes. This accounts for the effectiveness of so-called prestige suggestion. A person is also likely to be submissive in the presence of a crowd or any large number of people, and he is likewise more suggestible in such situations. The suggestibility of per-

sons in mobs and crowds is a phenomenon that has been very generally recognized and frequently described by sociologists and social psychologists.

Suggestibility also varies with the *affective and conative condition* of the subject. In general, a person is more suggestible in emotion than otherwise; but the increased suggestibility is likely to be of a specific nature. The subject is more susceptible to suggestions that fit in with his feelings and emotions. If he is afraid he is more susceptible to suggestions of fear, if angry, to suggestions that foster anger, and so forth. Similarly, a person in love is susceptible to any suggestions that harmonize with this sentiment, but he is not readily influenced by other suggestions. Thus he is easily persuaded to believe pleasant things about the loved one, but is likely to reject the unpleasant and annoying. A person may in fact be negative to suggestions that do not harmonize with his affects and impulses.

Suggestibility is likewise increased in *fatigue,* and especially in *illness*. This fact has considerable significance for the physician. A patient is submissive with reference to his physician and is also affectively predisposed to accept his suggestions. The importance of this circumstance even in the treatment of physical ailments cannot be overrated. The physician makes use of suggestion whether he intends to do so or not. His suggestions might be more effective if he gave some consideration to the subject. A physician can never be sure to what extent the patient's improvement is due to suggestion, and to what extent it is due to his prescription.

Furthermore, suggestibility is increased in any state of *dispersed attention*. In the drowsy or dreamy states of waking life, suggestibility is considerably augmented, and

the increase is more marked in the condition between waking and sleeping known as the *hypnagogic state*. The suggestions given by parents at the bedsides of their children are consequently likely to be very effective. It is said that results may be produced even by giving suggestions during sleep. Coué believed that a person could benefit by autosuggestions given in the hypnagogic state. He recommended that the person should repeat to himself just before falling asleep "day by day in every way I am getting better and better." Some psychotherapists require their patients to recline in an easy position and go into a drowsy state in order to apply therapeutic suggestions.

Suggestibility likewise varies with different individuals. Children as a rule are more suggestible than adults. A clever lawyer may get almost any statement he wants from a child on the witness stand by the use of "leading questions." Such questions are therefore not usually permitted in courts of law. Suggestibility varies considerably with children at different ages. In the course of development, periods of suggestibility are followed by periods of negativism. Adults also differ in their suggestibility.

The writer obtained some evidence to show that persons may be classified roughly into four types.[1] These types are of course not distinct. They represent limiting cases with all possible variations between them. First, there are some relatively *nonsuggestible* persons. These are the well-integrated personalities not easily influenced under ordinary conditions. Secondly, there are *suggestible* persons, who are relatively easily influenced by suggestions. Thirdly, there are *contrasuggestible* persons, who have a pronounced tendency to respond in opposition to sugges-

[1] J. W. Bridges, "An Experimental Study of Decision Types and Their Mental Correlates," *Psychological Monographs*, Vol. 17 (1914), No. 72.

tion. Fourthly, there are *variable* persons. These are sometimes suggestible and sometimes contrasuggestible. We all know persons who are at times very amenable to personal influence and at other times difficult and resistent to every suggestion.

Suggestibility and contrasuggestibility are often greatly exaggerated, especially in the psychoneuroses. *Hysteria* is characterized by extreme suggestibility. This is so marked that it has been regarded as the basic symptom of hysteria. In hysterical patients symptoms may be easily produced by suggestion, and the physician must be very careful in his examination to avoid giving suggestions of new symptoms. Hysteria is more frequently regarded as a form of dissociation. But this view is not really incompatible with the former, for suggestibility is itself an aspect of predisposition to dissociation.

In *dementia præcox* there is marked variation in suggestibility. This may take the form of hypersuggestibility or of negativism, and the patient may pass from one of these phases to the other. In the *hypersuggestible phase* he often imitates whatever the physician does or says. If he is asked a question he merely repeats the question, and if he is told to do anything he does it abruptly and automatically. He may also exhibit a symptom called "cerea flexibilitas." The muscles have a waxy resistance, and the limbs can be molded into almost any position where they will remain indefinitely.

In the *negative phase* the patient reacts in direct opposition to commands or questions. He is usually mute, and if asked a question his lips are pursed and tightly closed. If one offers to shake hands the patient's hand is seen to withdraw. He may also exhibit a symptom called "spring resistance." This is directly opposite to cerea flexibilitas.

If the physician attempts to move a limb, for instance, to raise an arm, he must overcome considerable resistance; and when he releases the arm, it moves quickly back to its former position. The alternation of the patient between the hypersuggestible and the negative phase is analogous to the alternation between suggestibility and contrasuggestibility in persons who are not mentally diseased.

Hypnosis.—Hypnosis is a state of increased suggestibility. There is thus in hypnosis an inhibition of the initiative and of the critical powers. It follows that there is a narrowing of consciousness. The subject attends only to the words and movements of the hypnotist. Narrowing of attention upon the hypnotist and special susceptibility to his suggestions has been called "rapport." The subject is supposed to be *en rapport* with the hypnotist and with no one else. But this is questionable, and it is possible that if another operator were substituted, the subject would be *en rapport* with him.

The hypnotic state is also a dissociated state. The inhibited powers are dissociated, and susceptibility to dissociated responses is increased. Hypnosis may therefore be regarded as an artificial neurosis closely allied to hysteria, for the fundamental symptom of hysteria is dissociation. Hypnosis is likewise related to sleep. The dissociated or inhibited part of the personality may be regarded as sleeping. These different aspects of the hypnotic state have been emphasized in the theories of different authorities. The divergent theories are more or less harmonized in the account here presented.

There are various means of producing the hypnotic state. No two hypnotists follow exactly the same technique. It is not our intention to describe any of these procedures in detail. It will suffice to mention certain

conditions which appear to be characteristic of all techniques. In the first place there is usually a definite *limitation of movement*. The subject is required to lie down or recline in an easy chair. Secondly, the subject must assume a *submissive attitude* towards the operator. There can be no active opposition. The subject is instructed to accept and believe whatever the hypnotist says. This submissive attitude is easier to assume if the hypnotist has considerable prestige. If he is an eminent physician or a well-known hypnotist, or if he has an Oriental manner and appearance, his prestige is usually greatly enhanced and the subject consequently becomes more submissive.

A third condition is that the subject should have an *emotional indifference* as to the consequences. If he is afraid or if he is too anxious, the hypnotic state is not so easily produced. Fourthly, the operator always produces some form of *monotonous stimulation*. The subject may be required to look at a bright object, or listen to the beating of a metronome. Usually the operator speaks in a low monotonous voice. He may continually repeat the word "sleep," or tell the subject that he is falling asleep, resting, relaxing, and so forth. Tactual stimuli may also be used. The operator gently strokes the forehead as he repeats the word "sleep."

In the hypnotic state a great variety of interesting symptoms may be produced. These are similar to the symptoms found in the functional neuroses especially in hysteria. They usually follow definite suggestions made by the hypnotist. If he suggests that the subject will not, or cannot open his eyes, the eyes remain closed. Similarly, he may produce a functional *paralysis* of the arm or leg. If he suggests that the subject cannot open his

hand, it may remain closed, and other *contractures* may be produced in the same way. *Anesthesias* and *hyperesthesias* may also be caused by suggestion. Cutaneous anesthesias are usually quite easily produced, but visual anesthesia may be brought about in some cases. This occasionally takes the form of *negative hallucination*. If the operator suggests that the subject cannot see some object in the visual field, the latter acts as if he did not see it.

Sometimes actual *illusions* and *hallucinations* are produced by suggestion. The subject acts as if he sees objects and hears voices or music when there is nothing of the kind present. In hypnosis there is frequently *amnesia* for certain past events, and *hypermnesia* for others. After the hypnotic trance the subject will have amnesia for the events of the trance, if he has been told by the hypnotist that he would not remember these events. Other post-hypnotic phenomena may likewise be produced. In other words, suggestions given during the trance may be carried out afterwards in the normal state.

In hypnosis there occurs what Morton Prince has called "a suggestive repersonalization." [2] A personality is an integration or organization of various mental and physical elements, traits, and abilities. These integrations may be broken down and a reorganization follow along different lines. Something of this sort occurs in everyday life as we pass from one mood to another. For example, in a depressed state there is not only a characteristic feeling tone but also ideas and purposes in conformity with these feelings. In an optimistic mood there is an integration of

[2] Morton Prince, "Suggestive Repersonalization, the Psychophysiology of Hypnotism," *Archives of Neurology and Psychiatry*, 18 (1927), 159-176.

a different feeling tone with a totally different set of ideas, impulses and wishes. In changing from one mood to another there has been a *depersonalization* followed by *repersonalization*. A similar phenomenon is produced artificially in hypnosis. There is a dissociation and disorganization of the mental life followed by a totally different reorganization. The hypnotic organization is, of course, a narrow one excluding many important elements of the personality. The same thing occurs in hysteria and particularly in so-called alternating personality. Repersonalization is thus a phenomenon of wide occurrence in daily life and in mental disease as well as in hypnosis where it is produced artificially by suggestion.

It follows from the above considerations that any one can hypnotize who has sufficient prestige, who has learned the technique, and who has the patience to apply it. On the other hand, every one cannot be hypnotized with equal ease. Some persons pass readily into the deepest hypnosis in which paralyses, anesthesias, hallucinations, and so forth, are easily produced. Others can be only partially hypnotized, and a few of the less striking phenomena can be brought about. Still others merely go into a state of drowsiness, while some persons cannot be hypnotized at all. The degree to which a person can be hypnotized depends upon his predisposition to dissociation. The value of hypnosis as a psychotherapeutic method is thus somewhat limited, but persons who cannot be hypnotized may nevertheless be influenced by suggestion in the waking state, or in the hypnagogic state. Suggestion is a broader therapeutic method than hypnosis.

CHAPTER XIX

PLAY, WORK, AND FATIGUE

There are two main forms of human activity, play and work. Play is activity for its own sake, while work is activity for some ulterior purpose. In play there is no distinction between means and end, the means is the end. In work this distinction is easily made, for work is the means to an end. This end may be of various sorts. It may be economic—the desire to make a living and acquire wealth. Or it may be self-improvement—the desire to achieve success and attain a better educational or social status.

Play includes practically all activity without ulterior motives, for instance, spontaneous activity, indoor and outdoor games, wit, repartee, dancing, and even art when it is carried on for its own sake. If any one of these essentially play activities is undertaken for economic gain, it becomes a form of work. Thus a distinction is made between "the amateur" and "the professional" in sport. Both play and work may be mainly mental or mainly physical activity.

Theories of play.—A number of different theories have been advanced regarding the nature of play. Only a few of the outstanding views will be mentioned here. One view is the theory of *superfluous energy*. This theory was propounded by the poet Schiller, and defended by the philosopher Spencer. According to it a child has an excess of energy which overflows in spontaneous activity. This

activity has no immediate utility or purpose and therefore constitutes play. No doubt much of the undirected and unorganized play of children can be explained in this way.

A second theory of play is known as the theory of *recapitulation.* This theory was suggested by Stanley Hall.[1] He regarded play as a rudimentary or vestigial form of the activities of bygone generations. This account of play fits in with the well-known biogenetic law that "the development of the child is a brief recapitulation of the evolution of the race." This law is at present not generally accepted and it is doubtful whether play can be accounted for by reference to such a law. The play of the child is not at all comparable to the known activities of primitive peoples, and furthermore the theory makes no attempt to account for the play of adults.

A third theory is that play is an *instinctive rehearsal for the game of life.* This theory was formulated by Groos.[2] He regarded the play of children and young animals as preparatory exercise for the serious work of maturity. For example, the playful fighting of kittens or puppies affords practice for real fighting later on. The same may be said of play of children, such as the hunting games of boys and the doll games of girls. This is a biological rather than a psychological theory, and from that standpoint may contain an element of truth. Play no doubt assists in the child's development, but this is an indirect result and does not explain why children play. Still less does it account for the play of adults.

A more satisfactory theory is that play is the *expression of instinctive and habitual drives.* This theory is

[1] G. S. Hall, *Adolescence* (Appleton, 1911).

[2] Karl Groos, *The Play of Animals* (Appleton, 1898); and *The Play of Man* (Appleton, 1901).

somewhat analogous to the theory of superfluous energy. Play is the overflow of energy, but the discharge follows along instinctive and habitual channels and thus affords a release for definite impulses. Variations in play interests of different persons depend upon variations in their native and acquired drives. This theory accounts for the play of adults as well as the play of children. Children express their instinctive interests freely in play. The work of the adult affords a means for the satisfaction of some of his interests. The others are held in subjection during work, and find their satisfaction only in play. Play is thus a manifestation and gratification of basal needs and fundamental impulses. The expression of these impulses is not necessarily a recapitulation of the past nor a preparation for the future. It is merely the outcome of present conditions. Drives are expressed because they exist at the moment, and play as such has no reference to the past nor to the future.

The value of play.—Play is nevertheless of considerable value in the mental and physical development of the child. Play activity promotes physical health and growth, and contributes to social development. In play the child comes in contact with other children, thus cultivating social behavior and important social traits. Play is also of value in education wherein it facilitates the development of the mental processes. These are some reasons why children should be provided with adequate play facilities, but after all the most important reason is because children are interested in play, and like other persons should have the opportunity of satisfying all legitimate desires. There is no scientific justification for regarding childhood as merely a preparation for adult life. Childhood is also a time in which to live, and attain whatever measure of

satisfaction that period of life can afford. If these satisfying activities also promote growth and development, so much the better.

Play has likewise a therapeutic and prophylactic value. It acts as a "safety valve" for the expression of aspects of the personality not participating in work. Sometimes work becomes irksome and can be carried on only with an ever-increasing effort. This may be due to the fact that other unsatisfied interests are at the same time striving for expression, and much energy is used up keeping them in control. Hence there is progressively less and less energy available for the task. The same inhibited interests may cause restlessness, insomnia, and disturbed sleep, which in turn reduce the energy of the organism. In such cases an interval of play may release the dammed up energy and enable the subject on returning to his work to put all his energy into the task instead of using it to combat unfulfilled desires. The work consequently seems easier, the feeling of fatigue is removed, and the sleep is less disturbed.

Play may therefore be a valuable form of treatment for certain psychoneurotic patients. The "play cure" is at least as important as the "rest cure" for these cases. The problem is to discover what sort of play should be prescribed for the particular case. This means that the patient should be studied by the physician, and his repressed drives and unsatisfied interests brought to light by a process of mental analysis. The patient himself may not clearly know what his mental conflict is about, or what his repressed or suppressed interests are.

The curve of work.—Variations occur during the continuous performance of a physical or mental task. These variations are found in both the speed and the

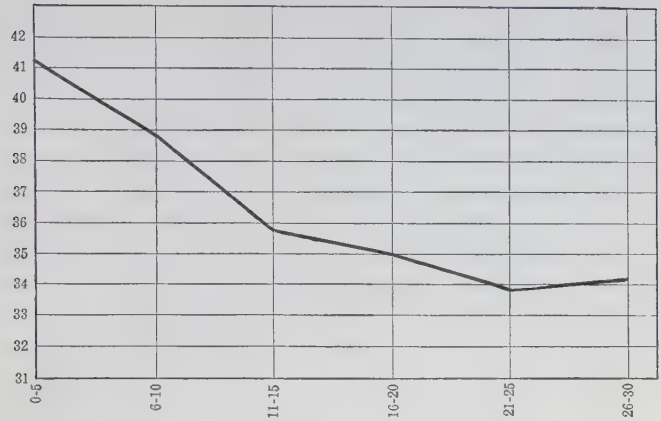

FIG. 23. WORK CURVE FOR TAPPING

The vertical axis represents the average number of taps in five seconds. The horizontal axis represents the successive 5-second periods of tapping. (Drawn from data of Wells, *American Journal of Psychology,* Vol. 19, 1908.)

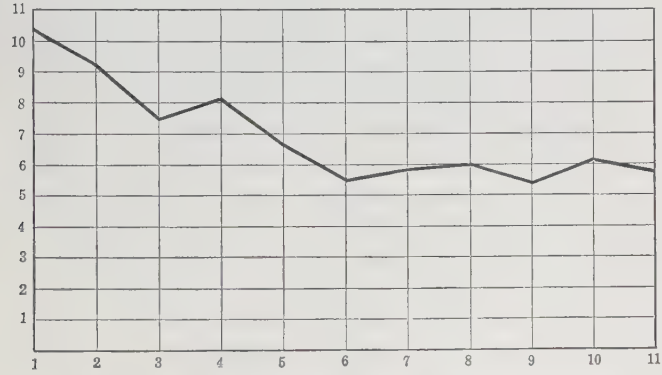

FIG. 24. WORK CURVE FOR MENTAL MULTIPLICATION

The vertical axis represents the number of 4-place by 4-place examples worked per hour of working time. The horizontal axis represents the successive hours of work from 11 A.M. until 11 P.M. (Drawn from data of Arai, 'Mental Fatigue," *Columbia Contributions to Education,* No. 54.)

quality of the performance. The chief variation is a gradual falling off in quality and in output. This general decrement is indicated in Figures 23 and 24. It is not, as

a rule, a uniform or continuous decrement. The work curve has usually many irregularities. *Spurts* and *lags* often occur during the performance of a task. These are increases and decreases in output or quality probably due to variations in the effort exerted by the worker. The two most noteworthy spurts are the "initial spurt" and the "end spurt." The former is a markedly superior performance at the beginning followed by a rather rapid falling off. The latter is an improvement at the end of a task, occurring when the subject knows that the work is about to end. A frequent characteristic of continuous work is a gradual improvement at the beginning, before the general decrement sets in. This is called "warming up." The worker takes a certain length of time to get under way. All these variations in the work curve differ greatly with different subjects.

Capacity for work.—The capacity for work varies with different persons and under different conditions. This capacity depends upon the amount of energy, and upon the resistance to be overcome in the expression of energy. There are individual differences in both energy and resistance. Variations in capacity for work are thus due to *physiological conditions,* such as illness or fatigue. In mental as well as physical diseases there is usually decrease in capacity for work; but in certain mental diseases, notably, mild manic states, there may be some increase in this capacity. Fatigue reduces ability to work, as indicated by the gradual decrement in the work curve.

Variations in capacity for work are also due to so-called *mental factors* which are, of course, really neural factors. The ability to work is decreased by mental conflict. Energy is used up in the conflict and there is less available for the performance of the task. Repression and

dissociation of impulses also reduce the capacity for work. Energy is thus blocked off and, although present, cannot be used in work. The resistance to be overcome is too great. The above conditions occur when the various impulses are not well organized and directed towards a common end, or when the end affords no satisfaction for the impulses.

The capacity for work likewise varies with the *nature of the task.* It is increased by congenial work and suitable surroundings. It is also increased if a person is interested in his work. In fact, capacity for work is very largely a matter of motive and incentive. Work that is compelled from without is never satisfying and is usually highly fatiguing. But if the drive or urge comes from within, the standard of performance is higher and the work is less fatiguing, because in this case there are fewer internal conflicts and resistances to overcome. Indeed, it is amazing what heights of achievement can be attained even by commonplace persons, when their work taps all the major drives, the fundamental sources of energy.

Fatigue.—Fatigue is reduced capacity for work resulting from sustained activity. Fatigue is due to two distinct causes. One is expenditure of the available nutrient material, the food supply. The other is accumulation of the waste products of metabolism. In *muscular fatigue,* the glucose or muscle food may be exhausted, or fatigue toxins such as sarcolactic acid and carbon dioxide may clog the tissues. As the glucose is used up an additional supply is carried to the muscles in the blood stream from the liver, which is a storehouse for a reserve of food. Exhaustion of muscle food is consequently not so rapid as it would otherwise be.

The fatigue toxins which accumulate in the muscles are washed out by the blood and carried to other parts of the body. The fatigue of a specific muscle may thus become general. It has been shown that if blood from a fatigued animal is injected into a fresh animal, the latter will show symptoms of fatigue, due to poisoning by the fatigue toxins. It was previously pointed out that adrenalin, which is thrown into the blood stream in fear or anger, helps to remove these fatigue toxins. Consequently, fatigue may suddenly disappear in times of emotional excitement.

Neural fatigue is analogous to muscular fatigue, for the nervous system may be affected in the same two ways. The neural food supply may be used up, or the nervous system may be clogged by fatigue toxins. Experiments have shown that the neurons themselves are not very susceptible to fatigue, although there is some evidence of both kinds of fatigue even in neurons. The synapses are probably the most susceptible parts of the nervous system to fatigue, and synaptic fatigue is no doubt chiefly a result of accumulation of products of metabolism or fatigue toxins. It is consequently more correct to speak of fatigue of neurograms or neural patterns than fatigue of neurons.

The fatigue of a neural pattern, even though very slight, may have very pronounced effects. It may increase the resistance of that pattern in relation to other patterns. The nerve current will consequently flow into the other patterns, producing marked changes in consciousness or behavior. Such *relative fatigue* [3] no doubt accounts in part for the frequent changes of interest from one task to

[3] Raymond Dodge, "The Laws of Relative Fatigue," *Psychological Review*, 24 (1917), 89-113.

another. This relative fatigue of neural systems or patterns is thus a matter of very great importance even if absolute neural fatigue is comparatively slight.

Mental fatigue is, like mental energy, a somewhat misleading term. There is no such thing as purely mental fatigue, just as there is no such thing as purely mental energy. Mental energy is really physical energy, and likewise mental fatigue is really physical fatigue. In the first place, it is partly muscular fatigue. In all mental work the muscles of accommodation and adjustment of the sense organs, and the muscles of general bodily posture are involved. For instance, in reading, the extrinsic and intrinsic muscles of the eye are constantly at work as well as muscles of the head and neck, and even of other parts of the body. In thinking, there is also incipient movement of the vocal organs, and other muscles. Mental fatigue may often be localized to some extent in the sense-organ muscles, and in the vocal organs. Secondly, mental fatigue is, in part, fatigue of the receptor cells of the sense organs, for example, the rods and cones of the eye and the hair cells of the internal ear. Thirdly, the largest part of mental fatigue is probably fatigue of the nervous system, particularly of the cortex, and is of the nature described above.

Various methods called "ponometric methods" have been devised to measure fatigue. None of these is entirely satisfactory. A subjective method is not satisfactory because the "feeling of fatigue" is not an accurate index of actual fatigue. Objective methods which measure fatigue by performance are not satisfactory, for the capacity to work is affected by factors other than fatigue, such as mental conflict and illness. It would be advantageous if the fatigue of children in school could be measured at

different times of the day, and if the fatiguing effects of certain tasks and school subjects could be determined. The methods now available are, however, not sufficiently accurate for this purpose, and the results of studies along this line are therefore of doubtful value.

Tiredness.—This is the *feeling* of incapacity for work, or of weariness. It may be due to illness, in which event the supply of energy is actually reduced. This may be illustrated by the lethargy of convalescence. Tiredness may also be due to actual muscular or nervous fatigue. The feeling of weariness is, however, not an accurate index of actual fatigue. The feeling may be too intense or too weak to indicate the true physical condition. In the former case, the subject feels tired without adequate fatigue, as in some forms of neurasthenia. In the latter case, he does not feel as tired as the actual fatigue warrants, and is consequently in danger of overactivity. This occurs in manic states, particularly the mania of manic-depressive insanity.

Tiredness may also have a so-called psychogenic origin.[4] It may be due to mental conflict. In this case there is no unified drive, and no adequate organization of the impulses. The energy is therefore used up in internal adjustments, or continually diverted from the task at hand into more interesting channels. Such tiredness may be removed by affording some form of expression for these unsatisfied interests, perhaps in the form of play. Psychogenic tiredness may likewise be due to "blocking off" of energy through repression and dissociation. This may be a result of unfavorable working conditions, as an uncongenial task, or a hated employer. Under these

[4] K. M. Banham Bridges, "A Form of Psychogenic Tiredness," *Mental Hygiene,* 10 (1926), 90-101.

conditions the resistance to work is too great to be overcome, and there is consequently a lack of interest and a weary feeling. The feeling of weariness in neurasthenia is usually due to such mental factors. Psychogenic tiredness is sometimes called "laziness," but its causes are as real and significant as the causes of actual physical fatigue.

Interest and ennui.—Interest is a complex phenomenon analogous to sentiment, which is described in the following chapter. It may be analyzed into ideas, feelings, and impulses. The ideational component is of central importance, for interest is always interest in something, but the intensity of interest is chiefly a matter of motive or incentive. The motive is based mainly upon feelings and instinctive or habitual impulses. These feelings and impulses are organized about the ideas.

Ennui or boredom is lack of interest in some particular thing or in things in general. Specific ennui may be due to a relative fatigue of the neural patterns involved in the activity which has become tedious. The nerve currents are thus diverted into other channels, and there is consequently a greater pressure of other drives distracting the subject from his task. General ennui may be a result of general fatigue and consequent lack of drive, as in lethargy; or it may be due to a mutual blocking of impulses, so that there is an *impasse* of interests. In this case the boredom might be removed by an expression of the conflicting impulses in play or other activity. The subject might then return to work with a renewed interest in his task.

Rest.—Actual fatigue can only be removed by rest. It has been shown that it is more effective to rest before one is quite fatigued than to wait until completely exhausted.

In the latter case the time for recovery is greatly prolonged. This is the main argument against a long working day. The worker never fully recovers from his fatigue. It has frequently been demonstrated that the quality and amount of work are actually increased when the working day is shortened. It has also been found that the output of work is greater, if rest pauses are interpolated at suitable intervals during the day. A person can achieve more by forty-five minutes of work and fifteen minutes of rest, than by an hour's continuous work. This is just as true for mental as for physical work. Frequent pauses for rest or play result in the achievement of a greater amount of work.

A great deal has been written about the so-called "rest cure" for nervous patients. This method of psychotherapy is not at present regarded as highly as it once was. It is felt that while rest is required by some cases, the majority need rather a change of activity. In other words, they need a "play cure" or perhaps a "work cure" rather than a "rest cure." A change to a more interesting form of work will be of therapeutic value, if the subject is enabled thereby to express other unsatisfied aspects of his personality. The change of work is equivalent to finding a suitable form of play for the same purpose.

Efficiency.—Efficiency means economy of energy in work. It means the best possible work with the smallest output of energy. The "best possible work" is work of the best quality produced in the shortest time. A person's efficiency is affected by numerous factors. It is affected by practice, fatigue, mental conflict, illness, and interest in the work. It is also affected by the surroundings and conditions of work, especially lights and noises. It is moreover affected by the length of the working day, and by

the distribution of pauses for rest during the day. Finally, it is very much affected by the technique of the work, such as the tools and machines used, and the work habits of the individual. It has been found that the habits of skill involved in work can be greatly improved as the result of study. For instance, all workers make many superfluous movements in their work. Efficiency is increased by eliminating these movements. Investigation of this subject is called "motion study," [5] and it has contributed much towards a greater economy of movement in industrial occupations.

Most persons vary in their efficiency at different times of the day. Some are more efficient in the morning and gradually *decrease* in efficiency throughout the day. Others are just the reverse, they are least efficient in the morning and gradually *increase* in efficiency during the day. Some increase in efficiency during the first part of the day and decrease during the last part, while others decrease in efficiency during the first part and increase during the last part. The diurnal course of efficiency may thus take at least four different forms. It has been suggested that efficiency may also vary during the course of the week or of the year, but no conclusions can be drawn from the data now available on this subject.

There has been a marked tendency to overemphasize the importance of speed in efficiency. We should rather emphasize the economy of energy. Even in purely physical work, quality is more important than speed, and the workman's output of energy is most important of all. In professional work, quality is of still greater importance. Such work requires thought, and thought is essentially a

[5] F. G. Gilbreth, *Motion Study*.

matter of the conservation of energy. This may be illustrated by comparing the behavior of the cat in a puzzle box (previously described) with that of a man in a similar situation. The cat's method of getting out is a "trial and error" method involving much useless activity. The man adopts a "rational method." He may remain perfectly still for a period of time and then make only the minimum number of movements necessary to solve the problem. A similar distinction may be made between the behavior of a feeble-minded person and an intelligent person in a problem situation. In the one case there is a minimum of thought and a maximum of activity. In the other case, there is a maximum of thought and a minimum of activity.

Efficiency in professional work requires a *maximum of thought and a minimum of activity*. This applies with special force to experimental work in science. There is often too much blind collecting of data and too little critical thought. The "rational method" would eliminate by thought many inadequate methods and much superfluous activity, thus conserving energy, time and money. This method implies a considerable period of study followed by the performance of the fewest possible experiments or trials necessary for the solution of the problem. It is better to spend nine hours in thought and one in pertinent experimentation than to spend ten hours in making irrelevant and haphazard observations.

CHAPTER XX

SENTIMENT

A sentiment is a complex mental process. It consists of an organized system of ideas, feelings, emotions, and impulses, pertaining to a person, an object, or an abstract concept, like "the true," "the good," or "the beautiful." The ideas constitute an associated group which may be called a "constellation of ideas." The feelings and emotions usually occur in modified form and are closely associated with the ideas and impulses. The impulses are both instinctive and habitual. An instinctive impulse frequently forms the nucleus of a sentiment. The impulses are associated with the other processes and organized into a major drive.

A *purpose* may be regarded as a kind of sentiment in which the chief component is an organized drive. The ideational element may consist merely of an idea of the end or goal, and the affective element may be reduced to a mere feeling tone. Purpose is thus a complex mental process developed with experience, and not a simple and fundamental element of consciousness. *Interests* and *aversions* are also kinds of sentiment. In these the ideational component is the most important, but the feelings are almost equally well marked, while the impulse or drive is at a minimum. It may consist merely of a general tendency towards or away from the object of interest or aversion.

The development of sentiments.—Sentiments are very gradually built up during the lifetime of the individual. The development of sentiments depends upon capacity to learn and upon experience. Capacity to learn means ability to acquire ideas, and to modify and condition feelings, emotions and impulses. It also means ability to form connections among simple processes, thus combining them. Experience may take the form of general environmental influences or of special opportunities such as formal education, special guidance and training. As a result of learning capacity and experience, ideas and habits are acquired, emotions and impulses are conditioned, and associative connections are established. The end-product is a complex and highly integrated system.

A sentiment is thus essentially a connection and organization of simple experiences. These experiences are associated and organized with reference to some particular object, person, or idea. But the integration does not stop here. In a well-developed personality the minor sentiments are themselves associated and subsumed under a major sentiment. Almost any sentiment may play the rôle of a major sentiment, but the "self-regarding sentiment" functions most frequently in this capacity.

Some common sentiments.—The number of sentiments is indefinite and almost unlimited, since they may pertain to practically any object or concept. Sentiments vary greatly in complexity, ranging all the way from the simple sentiment of affection for a pet to the most complex sentiment pertaining to social or religious life. All sentiments are similar in their general structure. Only a few of the more important will be mentioned by way of illustration.

The *intellectual sentiments* are those that pertain to

scientific truth, scholarly attainment, or some particular field of study. These sentiments are found in an abnormal form in the strange scientific beliefs and systems described in Chapter XVII. *Esthetic sentiments* are those which pertain to beauty or ugliness in general, or to particular kinds of artistic experiences, like music, painting, or poetry. Sentiments are also built up about such objects as pieces of furniture, chinaware, jewelry, or books.

The *social sentiments* are particularly numerous. They include the so-called moral sentiments, which consist of ideas, feelings, and impulses pertaining to "the good" in general, or to particular kinds of good, like justice, truthfulness, or honesty. They also include the sentiments relating to social customs, manners, good taste, and so forth. Such sentiments usually involve appreciation of the *mores* of one's own particular time and place, and depreciation of the *mores* of other times and distant countries.

Some social sentiments have reference to persons in distress, the poor and the needy. Here belong the sentiments for social reform and philanthropy. They involve the wish to help and protect, which is probably derived from the parental instinct. Similar to these are the sentiments that concern children. Some concern children in general and involve interest in their education, training, and mental and physical health. Others pertain to particular children, especially one's own. There are also sentiments concerning races, nationalities, and special social groups. These usually involve interest in, and appreciation of certain groups, and aversion to other groups. Sentiments with reference to particular persons are manifold and varied, and include loves, hates, friendships, and aversions.

Loyalty may be regarded as a special form of social sentiment. There are many loyalties, some relatively simple and some more complex. Perhaps the first loyalty to develop pertains to an individual, most likely mother or father. Then follows loyalty to one's own particular home and family. Later on there may be developed sentiments of loyalty to school, college, and country. And at a still higher stage of development loyalty may be extended to include mankind in general. Loyalty may also pertain to abstract concepts or ideals such as truth or justice. All these loyalties are similar in structure. They involve a large ideational content, many feelings and emotions, and pronounced impulses to behave in certain ways, especially to protect and defend the object or the ideal.

The *religious sentiment* is an especially complex one. It may involve practically all a person's ideas—scientific ideas, political ideas, ideas of men, and ideas of supernatural beings. But sometimes certain ideas, as those relating to science or to business, may be excluded. Religious sentiment also involves numerous feelings and emotions, such as love, fear, curiosity, self-subjection, and many compound emotions like awe, reverence, and gratitude. It likewise includes a variety of impulses which are manifested in ceremonials and other activities. All of these factors are more or less integrated, organized, and dominated by a major drive.

The *self-regarding sentiment* [1] is the sentiment pertaining to one's self. It is of special importance because it is frequently the dominant sentiment. Its nucleus is the ego instinct in either the positive or negative form, but

[1] For a more complete account of this sentiment, see William McDougall, *An Introduction to Social Psychology,* Chap. vii.

it also includes other impulses both instinctive and habitual pertaining to the self. It likewise contains feelings and emotions regarding the self, and numerous ideas concerning one's duties, rights, privileges, aspirations, disappointments, and so forth. The self-regarding sentiment may assume the form of self-respect or of self-depreciation; and its major drive may be the wish for power, fame, attention, possessions and family, or comfort and security. This sentiment is of particular importance in psychopathology, for mental health is largely determined by attitude towards the self and by proper evaluation and acceptation of the liabilities as well as the assets of the personality.

Hate is a sentiment in the psychological sense as well as love, and must be distinguished from anger which is a transient emotion. Hate includes the emotions of anger and fear; we always fear what we hate. It also includes the impulses of pugnacity and self-assertion; we wish to crush and dominate the hated person. The feelings involved are usually unpleasant, but at times they may be pleasant. They are pleasant whenever we have social justification or support for our hate. Thus it may be actually pleasant to hate the enemy during war. Hate likewise includes ideas and memories, particularly memories of insults and injuries. Other factors may also be involved, and the form or structure of the sentiment varies greatly with different persons and on different occasions.

Kinds of love.—Love is such an important sentiment and has so many varieties that it is desirable to consider it in special detail. The term "love" is used in many different senses, and is applied to emotions as well as to sentiments. It is necessary to distinguish between these various usages. In the first place, it refers to what Mc-

Dougall calls the "tender emotion," the emotion aroused in the parent by the offspring. This tender emotion must be distinguished from the sentiment of parental love. The *tender emotion* is a relatively simple and primitive experience which may be manifested in its crude form by animals, or by human parents at a low cultural level. The sentiment of *parental love* includes the tender emotion, and in addition the parental instinct, various habit impulses, and many constellations of ideas such as memories about the child and plans for his career. A similar kind of love is the sentiment of *filial affection.* This involves sympathetically induced feelings and emotions, memories, habit impulses, the compound emotion of gratitude, and so on.

The term "love" is also applied to the *sex emotion,* which is the relatively simple state of "thrill" or excitement that frequently accompanies and reinforces the sex impulse. The sex emotion must be distinguished from the sentiment of sex love with which it is frequently confused. This sentiment is analyzed in the following section. The term "love" is likewise used in the sense of friendship, which may exist between any two persons whether of the same sex or of opposite sexes. *Friendship* is a sentiment similar to love. Indeed many components of the two sentiments are identical. *Platonic love* is a form of friendship between a man and woman. It involves more of the sex impulse and emotion than ordinary friendship but less than sex love.

Analysis of the sentiment of sex love.—The sentiment of sex love is, like other sentiments, never exactly the same in any two persons, and it even differs in the same person at different times. The following analysis merely stresses certain outstanding factors. All these fac-

tors are not necessarily always present, and on the other hand there may be components which are not here mentioned. In connection with this analysis it is well to repeat that analysis does not degrade the thing analyzed or destroy its significance. A sentiment remains the same after as before analysis. But the analysis helps to a better understanding of it and increases the possibility of its control. Other sentiments might be subjected to a similar analysis with analogous results.

Perhaps the central factor in the sentiment of romantic love is the *sex instinct* or what Tridon has called "the organic impulsion." [2] This impulsion is not ordinarily aroused indiscriminately by any one of the opposite sex. It is usually elicited only by persons possessing certain characteristics which have a sex appeal. The characteristics which have this appeal are different for different individuals, and are called "fetishes." Almost any trait may act as a fetish for some one. It may be color of eyes, hair or skin, some physiognomical feature, or size and shape of hands, feet or body. The sex impulse is aroused in a person only by other persons who have his or her fetishes. A person's fetishes are probably determined by early childhood experience. They may be characteristics possessed by people associated with one's infancy and early life, as mother, father, nurse, sister, or brother.

Some of the more unconventional components of the sexual instinct may enter into the sentiment of love and color the picture. A certain amount of sadism and masochism is frequently included. Romantic love often involves wounding each other's sensibilities and feeling injured thereby. Exhibitionistic impulses are usually in-

[2] André Tridon, *Psychoanalysis and Love* (Brentano's, 1922).

cluded as artistic appreciation of the human form; and a certain amount of autosexuality may be involved in the form of self-love. The *sex emotion* as well as the sex impulse forms part of the sentiment of love. The sex impulse may of course occur without any sex emotion. The latter is usually consequent upon restraint or control of the sex impulse, and its physiological function is reinforcement of this impulse.

Other instincts and emotions also go to make up the sentiment of love. The *parental instinct* and the *tender emotion* are included not as desire for children but as desire to "mother" and protect the object of love. This instinct and emotion are usually elicited by children but may be aroused by other persons as well, and particularly by one who is loved. They insure the defense, protection, and care of the loved one. The *ego instincts* are of very special importance in love. They may take the form of submission, but more frequently they are manifested as impulses to dominate and to possess. There seems to be a universal tendency for a man to regard his wife as his personal property, and a woman has no doubt a similar impulse as is evident from the frequent use of the expression "my husband." Moreover, the impulse to make a conquest plays an important rôle in premarital love.

The *nutritive instinct* may be a part of the sentiment of love in the sense that a person becomes attached to the one who feeds him. This fact is expressed in the saying that "the way to a man's heart is through his stomach," and that "a woman marries for a meal ticket." The sentiment may also include other instincts and emotions, such as *curiosity* especially regarding sex matters, *fear* of losing the loved one, *anger* at obstacles to courtship, and so forth.

The simpler *feelings* and *sensations* also play their rôle in the sentiment of love. Pleasant experiences in common, which later become pleasant memories, increase the strength of the sentiment. All sorts of sensory pleasures may be involved, as well as sex pleasure in the narrow sense. These include the pleasure of seeing, hearing, smelling, and touching. The sight of a person good to look upon, and the sound of a pleasant voice are important factors in love. Pleasant odors need special emphasis because they are frequently overlooked. The effect of a delicate perfume or body odor is the more far-reaching and subtle because usually unconscious or only partly conscious.

But the pleasure of touch or dermal contact is of still greater importance. Infants derive very special pleasure from smooth, warm, dermal sensations, and a similar pleasure is derived by adults throughout life. This in part accounts for the common practice of "petting." Adolescent petting is closely related to the cuddling of infants and is similar to the huddling together of kittens in a basket.

The sentiment of love involves *idealization* of the person loved. Idealization implies modification of the primitive sexual feelings and emotions, their transference from the original sex object and their attachment to other perceptions and ideas pertaining to a total personality. This modification and transference may be partly due to sexual restraint. The modified emotions have a different reference and a somewhat different quality but remain at their original intensity. Idealization also means overvaluation of the loved person, who has thus a biologically unwarranted appeal. Overvaluation is in part due to modification and transference of feelings and emotions, and in

part to the fact that the person is identified with a previously created ideal.

This ideal or "love image" is usually a product of adolescent phantasy. Many persons during childhood or adolescence create a definite picture of the physical and mental characteristics of a future mate. Such a love image possesses all the longed-for physical fetishes as well as all the desired mental traits. Later on some actual person who possesses a few of these characteritics may be fitted into the love image. The dreamer falls in love, but all the time he really perceives only his own ideal and not the real person. The real person is thus greatly overvalued. This is the psychological significance of the expression "love is blind."

Congeniality is an important component of sex love. Congeniality implies mutual interests and principles. It is not necessary for congeniality that all interests should be in common, but there must be some community of interests, especially in play and the activities that fill the leisure hours. Congeniality is even more dependent upon common principles, that is, common views regarding fundamental religious, social, and political questions. Another factor in congeniality is sympathy. This may be a substitute for a lack of common interests. If two persons are not interested in the same things they may at least sympathize with each other's interests. Complete congeniality, however, requires mutual interests as well as sympathy.

The sentiment of love contains a very complex *ideational component*. There are memory ideas of past experiences of work, play, recreation, or adventure together. There are ideas of anticipation or plans for the future. There are also purely imaginative ideas, such as

those involved in the love image described above. The sentiment of love is fostered by pleasant ideas and tends to be inhibited by unpleasant ones.

Habit is likewise an important component of the sentiment of love. Persons become accustomed to each other's behavior, and the familiar is more likely to be pleasant than the strange and unusual. The important factor in the faithful devotion of a dog to his master is that the dog is accustomed to "his master's voice," his whistle, and his habits of work and play. This factor plays a similar and major part in all human affection.

Falling in love.—It follows from the above analysis that the development of a sentiment of love is ordinarily a slow and gradual process. Many of the factors involved depend upon years of experience. Is it then possible to "fall in love at first sight"? The organic impulsion and sex emotion may be aroused at first sight, if a person sees some one who possesses his fetishes. This may provide a nucleus for a sentiment of love which can only be built up by further experience. On the other hand, it is possible that a ready-made sentiment of love may be transferred rather promptly to a new acquaintance. Such a sentiment may have been developed in a previous love affair, or it may have been built up in phantasy and pertain to a wholly fictitious love image. When a ready-made sentiment is transferred to a person on short acquaintance, the love may be an intense one, but it is likely to be short-lived. The chances of a strange person fitting smoothly and permanently into a previously developed sentiment are relatively small. The person "falling in love" in this way is not actually facing reality. He is blinded by his own imagination. He is living in a "dream world" from which there may be a rude awakening.

There are permanent as well as transient components in a well-developed sentiment of love. The *transient* elements are the instinctive and emotional factors which may be aroused by any person possessing certain characteristics. These are the fickle components, for they are likely to cause a transfer of the sentiment from one person to another. The *permanent* elements are those which are more dependent upon common experience and therefore develop gradually. They include such factors as habits, interests, memories, anticipations, and other mutually interdependent mental processes. The more permanent elements constitute an essential part of the sentiment of friendship.

Jealousy.—Jealousy arises mainly in connection with the ego instincts and the self-regarding sentiment. A child exhibits jealousy whenever his parents give attention to some one else, or when he fails to receive the accustomed attention. This usually occurs on the advent of a new baby. An adult exhibits jealousy under similar circumstances, as when the loved one pays attention to some other person. Jealousy is a combination of anger and wounded vanity. It is more likely to occur in an instinctive and emotional form of love than in connection with a more highly developed sentiment. Perhaps the highest form of love would know no jealousy, because the ego instincts would become subservient to other factors. Jealousy occurring in love implies the predominance of selfish factors in the sentiment. It is significant for an understanding of the phenomenon that intense jealousy often occurs when the love sentiment is altogether absent.

The psychology of marital infelicity.—Marital infelicity is due to many causes, but only a few of them that are relevant to the present topic are considered here.

Marital happiness is obviously dependent upon the mutual satisfaction of many instinctive and habitual impulses and interests. Hence unhappiness is often due to *unsatisfied impulses*. Thus it may arise from an unsatisfied sex life. The unsatisfied sex impulses may be the customary ones, or certain unconventional ones which are likewise present. Marital infelicity resulting from lack of satisfaction for unconventional sex impulses is probably more common than is ordinarily supposed, since these impulses are so general. On the other hand, expression of a strong unconventional trend may cause unhappiness. For instance, an exaggerated sadistic trend may result in cruelty, such as wife-beating or constant nagging.

Unhappiness may also be due to lack of satisfaction for other instinctive impulses involved in the sentiment of love. The ego instincts may not get adequate gratification. The person concerned will then complain of lack of attention and appreciation, and will feel slighted and ill-used. Similarly, the parental instinct may not be sufficiently gratified, and the person may feel that the impulse to protect and cherish is always blocked. Other cravings and longings may likewise remain unsatisfied. For instance, the desires for proper and sufficient feeding, clothing, and housing may be only partly and inadequately fulfilled.

A frequent cause of marital unhappiness is an *excess of ego instinct*. This results in an exaggerated domination over and unreasonable interference with the other person. It constitutes what many women regard as the "bondage of marriage." Sometimes it takes the form of forcing one's own views and ethical principles upon the other person. This tendency is rationalized by the argument that one is merely trying to improve the other's moral principles or

"save his soul." A little more flexibility in ethical views might prevent many domestic quarrels. An exaggerated ego instinct also results in an excessive demand for attention, and in jealousy with its consequent misery.

Sometimes a married couple find that they are *not congenial*. They discover that they really have no mutual interests and no sympathy with each other's work or recreation. Such an outcome frequently follows hasty marriage as a result of "love at first sight." The couple at first do not see each other as they actually are, they see only their own ideals. Afterwards they discover that the real persons do not conform to the ideals.

Misdirected sympathy and *ill-advised helpfulness* may also cause unhappiness. For example, a person guided by the so-called golden rule, may endeavor to do as he would be done by. This rule does not take into account the psychology of individual differences, and consequently often fails to work in practice. Different persons desire different things, and what would be pleasant to one may be disagreeable to another. Instead of following the golden rule in our dealings with another person, it would be more in accordance with psychological principles to study the person's likes and dislikes and to do what he prefers rather than what we would prefer in a similar situation.

Marital unhappiness is also due in part to *unpleasant associations*. These may result from long periods of illness, or from financial or business worries, or from trying to live with relations. Dislikes thus become incorporated into the love sentiment. These dislikes are particularly disturbing since they are in direct conflict with likes in the same sentiment. Mental conflict between any tendencies within a sentiment tends to disorganize it and break it down. Therefore in order to develop a sentiment

of love and make it permanent, unpleasant and disturbing associations should be avoided.

Joy, sorrow, and happiness.—Joy arises from the satisfaction or fulfillment of an entire sentiment. This means that there must be a harmony of elements within the sentiment and a progressive attainment of its object. Joy may be contrasted with pleasure, which is the feeling that accompanies sensation or the satisfaction of instinctive or habitual impulses. Pleasure thus pertains to simple mental states, while joy is dependent upon the development of sentiments. Sorrow is the opposite of joy and implies a check or blow to a sentiment. This may be due to loss of the object of a sentiment, or to conflict within a sentiment that interferes with its development and harmonious functioning. Grief is a more poignant blow to a sentiment, as in the case of death of a loved one. It affects not only the sentiment concerned but also the self-regarding sentiment.

Happiness results from the harmonious working together of all the sentiments in subservience to some dominant sentiment or main purpose. It implies the absence of major mental conflicts between different sentiments as between love and duty, or between loyalty to country and loyalty to mankind. This involves a highly developed and well-organized personality. Such a personality may experience happiness in spite of sorrow and pain.

Abnormalities of sentiment.—Since a sentiment is a complex phenomenon, it will be abnormal if any one of its components or their combination is abnormal. Abnormalities in other mental processes may therefore lead to abnormal sentiments. Sentiments may also be poorly developed or entirely lacking, and conversely they may

be extremely well developed and highly organized. Sentiments may likewise be of an extremely unusual nature; and, finally, conflicting impulses may occur within a sentiment preventing its proper integration.

There may be absence or poor development of any sentiment, but lack of moral or social sentiments is of special importance. The subject's emotional and instinctive life then remains on a primitive level. When this occurs in conjunction with normal intellectual development, there may result antisocial and perhaps revolting criminal acts, which would be impossible if the social sentiments were normally developed. Absence of normal sentiments may be due to lack of affective learning capacity, or to faulty training and undesirable experiences.

Deterioration of previously well-developed sentiments occurs in certain mental diseases. The inhibiting effect of organized sentiments upon their component impulses is thus removed, and the patient may behave in an unusual and unexpected way. Deterioration of social sentiments often occurs at a relatively early stage of a mental disease, so that delinquency and immorality may be the first symptoms that are noticed. On the other hand, exaggerated social or moral sentiments are found in some mental diseases, particularly in the psychoneuroses. This is shown in overconscientiousness and in the appearance of moral scruples regarding unimportant details of behavior.

Complexes.—A complex may be regarded as an unusual sentiment involving strange beliefs and leading to peculiar or irrational behavior. A complex may be conscious, unconscious, or only dimly conscious. Unconscious complexes have been most frequently discussed, and some

authorities apply the term "complex" only to unconscious systems of ideas, feelings, and impulses. But the term may be likewise applied to such systems when they are conscious or partly conscious, if they lead to peculiar beliefs and behavior. It is, of course, not necessary to suppose that unconscious complexes exist as mental states and processes. They are more probably conserved merely as neural patterns and neural processes.

Complexes occur in an unlimited variety of forms. The strange scientific systems and beliefs previously described may be regarded as *intellectual complexes*. Food faddists, fresh-air fiends, and various quasi- and pseudo-scientists are motivated by such complexes. *Æsthetic complexes* are also relatively common. These are manifested in cubism, futurism, and other ultramodern and bizarre forms of art. *Social complexes* likewise occur. They are found in advocates of various eccentric social reforms, in suspicious persons who always feel that they are being slighted, injured or persecuted, and in persons exhibiting strange loyalties and aversions.

Religious complexes also deserve special mention. These take the form of peculiar religious beliefs, and frequently result in the formation of strange religious sects. The religious sentiment is so complex that abnormality in almost any mental process has an effect upon it. This is particularly true of abnormalities in the basic instincts and emotions, such as fear or the sexual instinct. For example, a pronounced sadistic or masochistic impulse may color the religious sentiment and lead to an emphasis upon suffering, sacrifice, penance, or "hell-fire" doctrines. It is interesting in this connection to note the frequent mention of blood and suffering in religious hymns.

The *inferiority complex* is an unusual self-regarding

sentiment in which self-depreciation rather than self-assertion is the central factor. This complex may be conscious, in which case a person experiences lack of confidence, impulses of self-abasement, and ideas derogatory to himself. On the other hand, the complex may be unconscious. In this case it is likely to be overcompensated for by feelings of superiority and by aggressive and egotistical behavior. Vain and conceited persons are usually defending themselves against their own unconscious inferiority complexes. An inferiority complex usually originates in childhood. It may be due to actual physical or mental inferiority, or to a feeling of inferiority that has been exaggerated by the critical and deprecating attitude of adults. An inferiority complex has a far-reaching effect upon one's efficiency, achievement, and general character; and it may play a part in the production of a psychoneurosis.

Another common complex is called the *"get-even" complex*. This also may be conscious or unconscious. A person may be dominated by a conscious desire to square accounts, or he may have an entirely unconscious drive towards the same end. In the latter case the person will always succeed in "getting even" without knowing that he wishes to do so, or even that he has achieved such a purpose. The outside observer may be more aware of his complex than he is himself. The "get-even" complex may be manifested in vendettas, grudges, and acts of revenge.

There are many unusual forms of the love sentiment. These may be called *love complexes*, or *sex complexes*. A sentiment of homosexual love may be developed on the basis of a homosexual impulse, just as a normal love instinct is built upon the heterosexual impulse. An excess

of any of the unconventional components of the sexual instinct may markedly alter and color the sentiment of love. Similarly, abnormality in other factors in love, such as instincts, emotions, feelings, habits or ideas, may affect the sentiment and produce a complex. For example, the coquette has a love complex in which an excessive ego instinct is the major factor. The coquette is dominated by the desire to make conquests, thus proving her power. There are likewise male flirts or "sheiks" who are motivated by a similar drive.

The "Don Juan" type of person has a somewhat different form of love complex. A Don Juan actually falls in love very badly, but the love is transient and soon followed by a new infatuation. According to the psychoanalysts a Don Juan is dominated by an *Œdipus complex*, that is, a complex of strong attachment to his mother. He is always seeking a mother substitute. Thus he falls in love with any woman who in some way represents his mother, only to fall out of love when he discovers his mistake. This Œdipus complex is of course unconscious. There is a similar type of woman who is perhaps dominated by a similar childhood attachment to her father or brother. Such a woman has been called a "Messalina" after a Roman empress noted for her series of intense love affairs.

CHAPTER XXI

MOTIVATION OF BEHAVIOR

The problem of the motivation of behavior has interested philosophers from the earliest times. It used to be regarded as an ethical question, and was usually called the problem of "the springs of human action," but it is now generally treated as a purely psychological problem. The question for consideration is not only "why we behave like human beings," but also why we behave like ourselves. In other words, it is necessary to account for human behavior as such, and also for individual differences in behavior. The problem of motivation has been neglected by the behaviorists, but it has been specially emphasized by the psychoanalysts. It is, after all, perhaps the most interesting and important problem in psychology.

The mechanism of behavior has already been described. It was shown to consist of receptors, effectors, and a complicated adjusting mechanism. The problem now is, what drives this mechanism? What is the source of the energy that operates the machine? The driving forces are called "motives." Some of these motives are conscious, while others are unconscious. That is to say, the causes of our behavior may be known or unknown to us. The chief motives, both conscious and unconscious, have already been mentioned; in fact, a considerable portion of this book has treated of the motivation of behavior. The present chapter is therefore merely a summary bringing together the more important points under one heading.

Normal and abnormal behavior are determined by similar motives. The difference in motives is mainly one of degree. The motives of abnormal behavior are either more or less powerful than usual. Moreover, in abnormal cases inhibitions are frequently removed, and the consequent behavior reveals motives that are usually concealed. Motives are thus thrown into relief. They become more obvious and may be studied to better advantage in abnormal than in normal cases. A study of abnormal persons is therefore of great assistance in solving the problem of the "springs of human action."

The source of energy.—It is obvious that the ultimate source of energy must be the nutrient material taken into the organism from the food we eat, the air we breathe, or the sunshine we bask in. This energy is stored in the various tissues of the body, in the sense organs, in the nervous system, in the muscles, and so forth. A reserve supply is stored in the liver, and is released when needed. It has been pointed out that adrenalin carried in the blood stream stimulates the liver to discharge some of this reserve supply into the blood stream whence it is carried to all parts of the body.

Energy is stored in the various tissues in the form of potential energy which may be liberated in various ways. A stimulus liberates energy in receptor cells. This freed energy in turn liberates energy in sensory neurons, then in other neurons, and so on perhaps to distant parts of the nervous system. The nerve current finally liberates energy in effectors, the muscles or glands. Nerve currents in passing through the nervous system from receptors to effectors may be widely dispersed and may overflow in general physical activity. As a rule, however, they follow certain instinctive or habitual channels. Such channels

may be relatively simple and direct as in reflex action, or highly complex and indirect as in purposive behavior. These *neural canalizations* and *patterns* constitute the neural aspects of the various special motives of behavior, which are described below mainly from the subjective standpoint.

Instincts as motives.—Instincts have been defined subjectively as primary and universal drives. They are impulses possessed in some degree by almost the entire human race. These impulses may be due to original nature, or they may be acquired chiefly as a result of social or group experience. In any case, they are fundamental in their importance. Behavior may be a direct outcome of such drives or an indirect consequence of them. In the latter case, the fundamental impulse may be quite unconscious, and the subject may rationalize his behavior, that is, give spurious reasons for it in order to conceal the motive and protect himself from criticism. When the instinctive drive is unconscious there may also follow overcompensation in consciousness or in behavior. In other words, the individual acts as if his behavior were due to just the opposite motive. This phenomenon will be discussed in the following chapter. The instincts have already been described in Chapter IX, but they are mentioned here again with emphasis upon their function as motives.

The *nutritive instinct* is a fundamental cause of behavior. The search for food determines much of the activity of both man and beast. Few men in modern times know the pangs of hunger and what extremes of behavior they may lead to. They may lead to theft, murder, or even revolution. In civilized life the motive is usually manifested in activity to prevent hunger rather than to appease

it. The importance of this instinct in motivating behavior will be evident, when we consider the enormous number of persons engaged in the production and marketing of food.

The *ego instincts* are of major importance in determining behavior. They include two main drives, self-assertion and submission. The first is the basis of the desire for power and attention, and may be called the "prestige motive." In its various forms it influences behavior from childhood to old age; but it is frequently cloaked and rationalized. For example, a great deal of what "Babbitts" call "service" is motivated not so much by the impulse to help as by the impulse to get "in the limelight" and make a favorable impression. Thus, people are often obliged to receive service that they neither request nor need. The other ego instinct is the basis of the desire for some one to follow and admire. Modern people as well as the ancients "must have a king" in one form or another. In the recent emphasis on "training for leadership" it is forgotten that some persons must also be trained as followers. To follow is as fundamental an impulse as to lead.

The Freudian psychoanalysts seem to believe that almost all human behavior is motivated by the *sex instinct* in one or other of its many forms. This view is obviously incorrect, but it has served to stress the importance of a major drive. The sex motive manifests itself directly in various activities pertaining to seeking a mate. This includes all behavior which aims to make us more attractive to the opposite sex. Athletic exercise, bodily adornment, clothir g, and the use of cosmetics are all determined at least in part by this motive. The sex motive is also manifested indirectly in various social activities, theatrical performances, art, literature, and even in religion. Further-

more, there is an enormous industrial machinery built up in order to cater to this motive in the production and distribution of cosmetics, perfumes, expensive and fashionable clothing, and the like.

The *parental instinct* is the tendency to "mother" or to protect. It is aroused by children, by the weak and helpless, and by the poor and needy. This instinct is therefore the basis of all true service, of social reform and philanthropy. Not only mothers but teachers, nurses, social workers, and physicians are motivated in part by this drive. Its importance is indicated by the number of persons engaged in these occupations, and by the amount of money spent on schools, hospitals, and other social agencies.

The *impulse to escape* from a dangerous situation or to seek security accounts for much of human behavior. This is usually called the instinct of fear, but it seems better to reserve the term "fear" for the emotion aroused in a similar situation. All human beings strive for security from actual or imagined dangers. It may be security from physical dangers such as disease, accident, or inclement weather. Or it may be security from dangers that beset intellectual or social position. Many persons are dominated by the "safety motive" and are always seeking protection against imagined ills. Moreover, this motive plays an important rôle in superstition, in religion, and in the maintenance of the social order. Furthermore fear of punishment is a factor in the training of children and in the prevention of crime.

The *instinct of pugnacity* also pertains to a danger situation. We often fight what we fear. The fighting instinct is thus sometimes regarded as less fundamental and primary than those already mentioned. But, on the

other hand, there seems to be a pronounced impulse to fight just for the sake of fighting. This impulse is expressed in boxing and other competitive games. Some satisfy the impulse by taking part in the contest, while others satisfy it as spectators. Thus large numbers of persons attend boxing matches, bull fights, and football games. The pugnacious instinct is also manifested in other forms of competition, such as school examinations and political and business rivalries. The building of armaments and battleships may be determined in part by the pugnacious instinct but no doubt to a greater extent by the impulse for security against supposed danger.

The *gregarious instinct* is likewise an important determinant of human behavior. Men as well as birds like to "flock together." They crowd into large cities instead of living in the open spaces, fresh air, and sunlight of the country. This impulse accounts for a great deal of social activity. We go to football games partly to see the match, but chiefly to be with the crowd. Similarly people are impelled to go wherever they see a crowd gathering.

Acquisition is probably also a universal tendency. People like to accumulate as much of this world's goods as possible. They not only amass money, land, buildings, and furniture, but also many less useful collections of curios, antiques, and the like. Another form of this impulse is the "something for nothing" motive. We all try to get what we can for nothing. We speculate on the stock market, and gamble at the race tracks or fashionable resorts. Many advertisers appeal to this desire by making absurd promises which are eagerly acted upon by credulous readers.

The *instinct of curiosity* may likewise account for some

forms of behavior. It is expressed in everyday life by inquisitiveness and the impulse to pry into other people's business. It thus plays a part in gossip and social conversation. Curiosity also leads to the search for the truth in science or history. It is, therefore, the prime motive of the scholar, and the basis of "science for its own sake."

Emotions and feelings as motives.—Emotions from the behavioristic standpoint are responses of the autonomic apparatus. These responses include glandular activity. The internal secretions so produced react upon the behavior mechanism and reinforce the responses. The autonomic responses also include "tensions" in various visceral organs. These tensions increase the overt activity and restlessness of the organism until a situation or a stimulus is found which removes the tension. Emotions thus augment instinctive or habitual activity. These emotions may be very general conditions of excitement, or more specific processes like anger or the sex emotion. Hence, emotions are important motives of behavior in the sense that they reinforce externally checked or internally inhibited drives.

Feelings are also important motives. According to one theory, all behavior is determined by the search for pleasure and the avoidance of pain. This theory, known as *hedonism,* is of questionable validity, but no doubt behavior is in part determined by seeking pleasant and avoiding unpleasant experiences. Thus we accumulate unnecessary comforts and luxuries, and carry on vigorous clean-up campaigns for the removal of filth and vermin, and the prevention of disease. Feelings, moreover, enter into our likes, dislikes, prejudices, and other complex processes, which in turn affect our behavior.

Habits as motives.—Habits are impulses and behavior patterns of a more individual nature than those previously mentioned. All instincts are modified by habit. For example, the ego instinct may be expressed in sports, in social activities, in business, in politics, or in intellectual pursuits. There is a similar large variety of modes of expressing the other instinctive impulses. All such modes of behavior are habitual modifications of instincts. There are also habits not so closely related to the instincts. These likewise become motives. They account for our individual routine, such as our methods of washing, dressing, or working, and our individual manners, accent and pronunciation. These habits are difficult to change and make up a large part of behavior.

We have habits of work and habits of play. Habits of work are manifested in their purest form in work for its own sake. This behavior has been called the "instinct of workmanship," but it is perhaps not sufficiently universal to merit the designation "instinct." There are also social and moral habits which are usually regarded as specially important. These include habits of control which constitute an important aspect of character. There are likewise habits of thought and habits of feeling such as the likes and dislikes mentioned above. Habits are conservative factors in life. They keep people in their respective spheres and maintain the *status quo*.

Imitation and suggestion.—A very common motive of behavior is to do what others do. At home the child imitates his parents, in school he imitates his teacher. He likewise imitates the behavior of others whom he regards as heroes or superiors. Imitation may be conscious or unconscious. It is manifested in the spread of fashions and customs. Many people travel or go to fashionable

resorts just because others are doing so. Most persons like to do the "done thing" and avoid being eccentric or unusual. Feelings and emotions are imitated as well as other forms of behavior. We may be angry or afraid, sad or happy, in sympathy with the feelings of others. We also like to think as others think, especially on philosophical, religious, or political questions.

Suggestion exerts a very powerful and subtle influence upon behavior. Much of our imitation is unintentional and thus due to suggestion. Suggestion is an important constructive agent in education and in psychotherapy, but it also permeates and affects all the various phases of daily life. The psychology of the stock market is largely a matter of suggestion. The speculator is influenced by various rumors, reports, and tips. Suggestion is likewise of prime importance in salesmanship, and its influence is indicated by the frequency of purchases that are neither necessary nor desired.

Sentiments, interests, and purposes.—Behavior is also determined by more complex mental (and neural) processes. Of chief importance among these are the sentiments. Loyalties, loves, hates, and religious views exert a powerful influence upon behavior. The particular kind of sentiments called "interests" are also important motives. An interest in some particular subject may be the chief factor in determining a person's career.

Purposes are commonly regarded as the most important motives of all. This is, no doubt, because they are conscious and highly organized drives. These drives are themselves derived mainly from the instincts and habits, but the organization of drives is the unique factor in purpose. A purpose also involves an idea of a goal or "an ideal." Behavior is influenced and directed by this ideal.

Purposes and ideals are thus factors of real significance in the motivation of behavior.

Complexes.—The unusual sentiments called "complexes" are of considerable importance as motives. They are likely to be overlooked because they are often unconscious. Behavior due to unconscious complexes is of special interest. It is usually rationalized by the subject, who is not so well aware of his motive as the external observer. The latter may correctly interpret the behavior or intuit the motive when the subject himself is led astray by his own rationalization. For example, a politician may believe that his motive is altruistic, and that he is serving his country and the common weal, while his fundamental drive may really be ambition and social prestige.

Beliefs, delusions, and prejudices.—These are, like sentiments, highly complex phenomena, and are based upon simpler processes, especially feelings, emotions, instincts, and habits. Beliefs and prejudices affect behavior, but they are really superficial motives. The fundamental motives are these simpler processes, which have already been considered. The various kinds of beliefs, delusions, and prejudices, and their relation to mental disease and mental health were discussed in detail in Chapter XVII.

Reason.—It is doubtful whether reason is ever a motive. Are we ever led in cold blood to an action or belief as a result of reason? Perhaps we are in pure science or in mathematics, but in real life our motives for action and belief are, as a rule, more basic and vital processes, as for instance, feelings, instincts, habits, sentiments, and prejudices. Reasoning usually follows rather than precedes belief and action, and presents socially acceptable grounds for our behavior. In other words, reasoning is generally rationalization.

A motive which exerts considerable influence on our views and actions is the "urge for consistency." This is usually regarded as a rational motive. But its rationality is questionable, "consistency is the bugaboo of small minds." This motive is clearly, at least in part, a matter of pride and intellectual vanity. We gain prestige among our fellows by appearing consistent. In other words, the urge for consistency is based upon more fundamental instinctive factors.

Interaction of motives.[1]—Motives interact in various ways. In the first place, there may be a *summation* of motives. Behavior is then not due to any one motive but to a number of them working together. This occurs in any well-organized sentiment where the simple impulses are integrated and harmonized. Summation may also occur apart from sentiment when any two or more drives work together. For example, pugnacity and self-assertion are combined in aggressive behavior, while submission and "safety-seeking" are combined in timid and retiring behavior. The best example of summation of motives is in a life's purpose, which involves a major sentiment and an integration of the chief impulses of the personality into one dominant drive. Such a summation of motives greatly increases the efficiency and consequent achievement of the individual.

On the other hand, there may be a *conflict* of motives. Conflict may occur between relatively simple impulses, such as the impulse to escape and the impulse to fight, or the "prestige motive" and the "safety motive." It may also occur between impulses within a sentiment, thus reducing the effectiveness of the sentiment. Or it may occur

[1] M. K. Thomson, *The Springs of Human Action* (Appleton, 1927).

between two well-organized sentiments, thus tending to dissociate the personality and reduce its total effectiveness. The various forms of conflict and their consequences will be considered in the following chapter.

CHAPTER XXII

MENTAL CONFLICT AND ITS CONSEQUENCES

Mental conflict arises from the fact that a personality is not a perfect unit, but is constituted of many diverse components, including the various instincts, habits, feelings, ideas, and sentiments already described. If a person were a single and complete unit there could be no mental conflict. His ideas would be consistent, his feelings and emotions harmonious, and his behavior coherent. Such, however, is not the case. In the same personality there is often marked incompatibility of ideas, disharmony of feelings, and antagonism of impulses.

All mental conflict is fundamentally *intrapsychic*, that is, between forces within the personality. The so-called conflict with reality or authority is really a conflict between the urge to satisfy certain primitive personal motives and the urge to respond in accordance with the demands of reality or authority. *Reality* may be too painful for a person to accept, as it may be in direct opposition to his wishes. This may be illustrated by a person's experience when he discovers he has overdrawn his bank account, or when he sees the horse he backed coming in as an "also ran." In such cases it may take one a long time to accept the facts, because of their unpleasant nature. There are people, especially children, who altogether refuse to face painful facts and who go on living in a world of phantasy in which their desires are easily realized. Such people are not well-adapted to the real world in

which they must live and work. An extreme form of this "flight from reality" is characteristic of certain forms of mental disease.

Conflict may also arise in relation to *authority*. The individual from his earliest childhood is obliged to submit to authority, first the authority of parents, then of teachers, and later on of law and social convention. Acceptance of authority is always difficult because it comes into conflict with the desire to assert one's individuality and to dominate others. Sometimes when authority is too severe or crushing the individual openly rebels against it. He may thus become an extreme radical of the emotional or revolutionary type. He may, on the other hand, succumb to the authority and develop a thoroughly docile but ineffective personality.

Mental conflict may likewise occur between other *instinctive drives,* emotions, or sentiments, as between fear and curiosity, or fear and anger, or love and ambition. This may be illustrated by a man's experience when he hears a noise in the basement in the middle of the night. He wishes to assert himself by making an investigation, thus proving his heroism in his own or his wife's opinion. On the other hand, he is afraid of the possible danger. In such cases the mental conflict may be so great as to prevent satisfactory action. It was previously pointed out that conflict within a sentiment tends to disintegrate the sentiment. Conflict between sentiments likewise tends to disorganize the personality and cause unhappiness and inefficiency.

Anxiety.—Mental conflict usually results in a "feeling of anxiety"; and when it is greatly prolonged, as in the frequently occurring conflict between love and duty, this anxiety becomes very pronounced and persistent. In order

to produce such anxiety the conflict must involve affects and impulses. Incompatible ideas alone may result in intellectual *doubt,* but can scarcely cause anxiety.

The conflict producing anxiety may be a conscious one, like the conflict between loyalties, or between interests and aversions. But sometimes one or both of the conflicting drives or complexes may be outside of consciousness. In this event, the subject is not aware of the causes of his anxiety. These may be revealed through a process of analysis by which the repressed impulses and ideas are brought into consciousness. Mental conflict is frequently the cause of a so-called "anxiety neurosis." Anxiety may, of course, have other causes, some of them purely physical, such as hyperthyroidism, but it is perhaps most frequently due to mental conflict.

Repression.—Another result of mental conflict is repression. This means the pushing out of consciousness of some unacceptable experience. Repression, like anxiety, implies a conflict of affects or impulses. Conflicting ideas are not usually repressed unless they occur in combination with feelings and impulses. Repression may be illustrated by the following examples. If a person has in mind two apparently incompatible systems of ideas and feelings, such as those pertaining to poetic mysticism and to science, the conflict may be solved by forgetting one of the systems and keeping only the remaining one in mind. Again, if a man experiences sentiments of love and hate for the same woman, loving her for one set of characteristics and hating her for another, it often happens that either the hate or the love is put out of mind. He then feels only love or hatred and is unaware of the repressed emotion of the opposite kind.

It is important to note that according to the view here

expressed either side of the conflict may be repressed—the desirable or the undesirable. This is contrary to the Freudian view that only the socially unacceptable trend is repressed. Repressed systems of ideas, feelings and impulses are called "unconscious complexes." These unconscious complexes are often directly opposite to conscious experience and behavior. There is thus some truth in the saying that when a woman says no, she may mean yes. Strictly speaking she means both no and yes; no, consciously, yes, perhaps, unconsciously.

Sometimes repression is only partly successful. The affective aspect of the repressed trend may remain behind in consciousness as a free "floating affect." This emotion or feeling may later become attached to some other idea or perceived object. The phenomenon may be illustrated by the case of a person who is unable to win the object of his love. The specific craving for that loved one may be repressed and may even be changed into aversion, but the love emotion or sentiment thus dissociated from its object may later be transferred to another person who in some respects represents the original first love. Since some form of repressed love is frequently at the root of the neuroses, it often happens in the course of treatment by psychoanalysis that the love of the patient is transferred to the physician whose task is then to redirect it into healthful and desirable channels.

Other emotions and feelings may also become floating affects. When a terrifying experience is repressed, the fear may remain behind and become attached to some other object, thus constituting a phobia. In the same way, anger may remain in consciousness as a feeling of irritability long after the event which caused the anger has been forgotten. Similarly, the feeling of tiredness may persist

when the fatigue-producing experience is forgotten and the actual fatigue removed. Moreover, since mental conflict and repression are in themselves fatiguing, repression becomes an exceedingly important factor in the production of neurasthenic fatigue.

Dissociation.—The above examples lead to a discussion of dissociation, which is frequently a result of mental conflict and repression. The repressed and dissociated processes may be relatively quiescent, that is, the neurograms involved may be temporarily inhibited and inactive. These dormant processes may be later reactivated, in which case they may become associated with other processes and become conscious. On the other hand, the dissociated processes may maintain an independent activity which may be either coconscious or purely neural (see Chapter V). Dissociation is the major symptom of hysteria. All the many hysterical symptoms may be understood as forms of dissociation. It is, moreover, an important symptom in other mental diseases. It was described from both the neurological and psychological standpoints in previous chapters, and needs no further consideration here.

Overcompensation.—One of the most common and obvious consequences of repression is overcompensation or defense reaction. It is an exaggerated development in consciousness and in behavior of the very opposite of what has been repressed. If in the previously mentioned conflict between scientific and mystical sentiments the scientific ideas are repressed, a person may adopt a poetic or mystical account of life, very beautiful perhaps, but too impractical for a workaday world. On the other hand, if his poetic or mystical ideas are repressed he may become too dogmatically scientific. Often the two

systems of ideas alternate, and a person changes from a scientific to a mystical view according to his company, the state of his health, or the weather.

Another example of overcompensation is when a person represses the sentimental side of his personality and becomes very cynical, perhaps as a result of disappointment in an early love affair. It is well known that cynical persons are often sentimental at heart. This is probably why a cynical old bachelor, if he falls in love late in life, may become unusually sentimental and perhaps silly. His love sentiment repressed in adolescence emerges in an undeveloped form, and his resulting behavior is thus not in accordance with his age and other experiences.

Again, if a person represses a feeling of inferiority due to some real or supposed defect in his make-up, he may develop the opposite traits of character, namely, extreme vanity, conceit, and aggressiveness. Also when a person's sensuality is repressed he may become on the surface extremely prudish and exacting. It is characteristic of emotions and impulses which are due to overcompensation that they are very intense and impelling. Therefore if we experience any unusually strong emotion or dislike, we may suspect that we are perhaps overcompensating for the opposite impulse or feeling within ourselves. This is particularly true of prejudice and intolerance. We cannot tolerate what we are defending ourselves against.

Psychoneurotic symptoms are sometimes a result of overcompensation. For instance, a phobia may be a compensation for desire. We often fear what we crave most. Certain sex phobias may perhaps be accounted for in this way. Similarly, an abnormal hate may be a defense against repressed love, and megalomania may be an overcompensation for a feeling of inferiority. Even purely physical

symptoms may on occasion be overcompensations for physical inferiorities or defects.

Projection.—Another result of repression is called projection. This means ascribing to others one's own repressed cravings or complexes. These complexes are then perceived in other persons who are perhaps condemned for having them, for it is easier to reproach others than one's self. This peculiar mechanism may explain the attitude of persons who are extremely severe and drastic in their condemnation of the criminal, and who believe in punishment for its own sake or as a compensation for crime. Such persons probably have strong tendencies to do just what the criminal has done. They repress these tendencies and project them upon the criminal, thus avoiding self-reproach which arouses an unpleasant emotion. They then advocate drastic punishment of the criminal in an abortive attempt to annihilate these undesirable impulses. In the suffering of the criminal they make vicarious atonement for what they regard as their own sins.

Projection may likewise occur with reference to emotions and feelings that are not repressed. It may be illustrated in the universal tendencies to believe that the person we hate, hates us; that the person we love, loves us; that the person we have broken faith with, is unfaithful to us, and so on. Such beliefs are satisfying to the individual. They appeal to his vanity or enable him to avoid self-criticism. Projection accounts in part for the pleasure people take in gossip and scandal-mongering. They get satisfaction of their own impulses or wishes in gossip about other persons, who may have done what they themselves consciously or unconsciously wish to do.

Projection is also found in interesting forms in mental diseases. In delusions of persecution the patient projects

his own suspicion and hate upon other people. Similarly, in delusions of infidelity and jealousy, the patient projects his own unfaithfulness on some other person whom he falsely accuses. Projection may even be found in connection with perception. In hallucination the patient projects his own ideas outward, and then perceives them as if they were coming from the external world. In hallucination a patient can hear and see only what is in his own mind, but he usually believes that it comes from an external source.

Other results of conflict and repression.—The transference of a floating affect from one idea to another has already been mentioned. *Transference* is, however, a broader principle applying to complex as well as simple mental processes. For instance, a sentiment may be disattached from its original object and transferred or attached to some other object, as when an immigrant transfers his loyalty from one country to another. *Rationalization* may also be regarded as a result of conflict. A person would not give specious reasons for his behavior, if his ideals were not in conflict with the motives which really cause the behavior. There are other phenomena in everyday life which may be regarded as indirect expressions of repressed impulses or complexes, or perhaps as symbolical representations of mental conflict. Some of these are mannerisms, slips of the tongue, forgetting important engagements, some forms of wit, dreams, and many nervous symptoms.[1]

Mannerisms are habitual responses peculiar to certain persons. Habit alone may be sufficient to account for many of them. Some of them are dissociated activities, that is,

[1] See Sigmund Freud, *Psychopathology of Everyday Life* (Macmillan, 1917).

activities due to the independent functioning of neural patterns more or less blocked off through high synaptic resistance from the rest of the nervous system. The psychoanalysts, however, find in mannerisms the indirect expression of "repressed complexes." They believe that every such movement has "a meaning of its own," which can be revealed by psychoanalysis. Some mannerisms may be better understood from this point of view, which is not incompatible with the theory of dissociated neural activity mentioned above. It merely gives a further account of the causes of the dissociation from a purely subjective standpoint. Some *psychoneurotic symptoms* are similar to mannerisms and may be explained in the same way.

Slips of the tongue have also been accounted for in this manner. They are supposed to reveal repressed impulses and desires. In a slip of the tongue a person often says what he really wished to say. Some slips of the tongue may be due to such causes, while others are due merely to habits of speech, or to similarity of the words actually spoken to those intended to be spoken.[2]

Forgetting has a number of causes which have been discussed in Chapter XIV. Forgetting an important engagement may be due to either a conscious or a repressed desire to absent one's self. A person may be occupied with something more interesting, or may have a positive aversion to the engagement in question. We frequently forget what we want to forget, and remember what we want to remember. The "obliviscence of the disagreeable" is a well-known phenomenon. Exaggerated forms of such forgetting occur in mental diseases, particularly in the psychoneuroses.

[2] A. A. Roback, "The Freudian Doctrine of Lapses and Its Failings," *American Journal of Psychology*, 30 (1919), 274-290.

There are many different kinds of *wit,* and no doubt each kind requires a different explanation. Hence many theories of wit have been suggested. The psychoanalytic theory relates wit to conflict and repression. Wit is a modified or sublimated expression of antisocial or primitive impulses. According to Freud, the "motives of wit" are either obscene or hostile,[3] that is to say, the impulses expressed are either sexual or aggressive. These impulses are expressed through a "technique of wit," which is a method of concealing the motive in cultured and socially acceptable language. Wit has thus, like play, a prophylactic and therapeutic value. It is a "safety valve" permitting the expression of fundamental drives, and thus preventing the undesirable consequences of conflict and repression.

Sublimation.—Repression with its usually undesirable consequences is not, however, the only possible result of mental conflict. A conflict may be solved in such a way that both conflicting elements attain a degree of satisfaction. This form of resolution of a conflict is called "sublimation." The conflict between mystical and scientific ideas may be resolved by modification of both views so that they are included in a more comprehensive system of ideas called "a philosophy." The conflict between actual inferiority and the wish for power or superiority may be resolved by accepting our limitations and making the best of the abilities we possess. The general conflict with reality may be resolved by accepting it temporarily as it is, and then trying to make it conform to our ideals. Similarly, authority may be accepted and at the same time questioned.

[3] Sigmund Freud, *Wit and Its Relation to the Unconscious* (Moffat, Yard, 1916).

The sublimation of instinctive impulses may be illustrated by the case of pugnacity. If pugnacity is expressed in its original form, the person finds himself at variance with the law and may be arrested for assault or murder. If, on the other hand, pugnacity is completely repressed, the person lacks an important incentive to achievement. This instinct may be sublimated, however, or expressed in a modified form. Pugnacity may be sublimated into so-called scientific boxing according to definitely formulated rules. To do a thing according to rules or regulations is always to some extent a sublimation. Pugnacity may also be sublimated into competition in school examinations. It may be expressed in writing polemical pamphlets, or in a political campaign. A great deal of pugnacity is expressed in the oratorical contests of political opponents. In these various sublimations the subject lives out his pugnacity and at the same time conforms to the social order in which he lives. Other primitive impulses may be sublimated in a similar manner, and this is the ideal resolution of mental conflict; because in this way a person avoids anxiety, repression, mental ill-health, and the formation of undesirable traits of character.

The psychology of mental conflict has thus some definite implications for mental health. It indicates that a person will be happier and healthier mentally if he can resolve his conflicts and avoid repression. In order to do this, he must first of all *know himself* as completely as possible. His unconscious ideas, feelings, and impulses must be brought into consciousness. He thus attains greater unity of personality, greater control over the various aspects of himself, and incidentally, since he finds much within himself that he criticizes in other people, he becomes more tolerant and sympathetic. Secondly, he must try to *accept*

himself as he really is. If he finds he has certain defects or is mediocre in ability, he must accept the fact and make the best of the abilities he possesses. Thirdly, he must *be himself,* that is, he must give up sham and pretense.[4] William James once said that many people in Boston would be happier if they gave up the pretense that they were fond of music. Many people everywhere would no doubt be happier and therefore healthier, if they gave up some of their pretenses.

[4] See J. A. Hadfield, *Psychology and Morals* (Methuen, 1923).

CHAPTER XXIII

SLEEP AND DREAMS

Sleep is a very important phenomenon, for the average person spends one-third of his life in bed. Different persons seem to require very different amounts of sleep, but most people need about eight hours. The amount needed for health and efficiency can be determined only by personal experience. A part of the time during sleep is usually spent in dreaming. Dreaming is thus a normal phenomenon although it is frequently discussed in textbooks on abnormal psychology. Most persons dream, and it is therefore just as abnormal not to dream at all as to dream a great deal.

SLEEP

Description of sleep.—Strictly speaking, sleep has no subjective aspect. It has been called the resting time of consciousness, for consciousness is completely dispersed or altogether absent. The threshold of consciousness is raised. It is true that dreams may occur during sleep and a form of consciousness may therefore be present, but this means partial awakening. There is really no clear-cut distinction between what is usually called sleeping and waking. In sleep we are less awake than in the waking hours, and in waking life we are less asleep than in sleep.

From a behavioristic standpoint, sleep is obviously a limitation and reduction of movement. But here again we see that the distinction between sleeping and waking is

arbitrary. There may be a marked reduction of movement during waking life, and conversely considerable movement may take place during sleep. Talking frequently occurs and in some cases even walking about. Recent experiments in which the movements of the sleeper were recorded by means of a mechanical device attached to the bed, have shown that movements occur during sleep oftener than is ordinarily supposed. "Of twenty-two college boys studied at Mellon Institute, the least motile stirs about once in twenty-five minutes; the most active, once in seven and three-quarters minutes; the most typical, about once in thirteen and half minutes." [1] Infants and children stir in their sleep even more frequently. There is considerable difference among individuals in the length of the quiescent periods during sleep. The length of these periods may indicate roughly the depth and completeness of sleep. Those who stir less frequently usually require fewer hours in bed than those who stir more frequently.

There are also individual differences in the rate of going to sleep and of waking. Some persons wake up very gradually. They may be only half awake for the first hour, three-quarters awake for the second hour, and so forth, becoming fully awake only well on in the evening. They then go to sleep in the same gradual way. These are the night workers. Others wake up more abruptly, reach a maximum wakefulness early in the day, and are ready to go to sleep early in the evening. These are the morning workers. Experiments seem to indicate that the more profound and motionless the sleep, the less efficient the subject will be in the morning, and the more efficient he will be in the evening.

[1] H. M. Johnson, "Is Sleep a Vicious Habit?" *Harper's Magazine*, November, 1928.

Theories of sleep.—Claparède has described *sleep as an instinct* evolved from the primitive rest state of animals to protect the organism against fatigue.[2] This view would make sleep not the result of fatigue but rather a device for preventing it. It is a biological theory relating sleep to the resting state of animals and to instinct. Sleep is a universal phenomenon and may therefore perhaps be classified as an instinct. But this does not solve the problem. It is not an ultimate solution of any form of behavior to classify it as an instinct. The real problem is a neurological one, namely, what goes on in the nervous system.

It was previously pointed out that the neural patterns of the brain are arranged in a hierarchy of levels. At the top of this hierarchy are the systems relating to thought and speech; at the bottom are those relating to respiration, circulation and other vital functions. Sleep occurs when *the higher levels cease to function* and the lower systems dominate the organism. It is not necessary to suppose that these higher cortical patterns all become inactive at once. They probably go to sleep separately. Here again we see the arbitrariness of the distinction between sleeping and waking, when the terms are descriptive of a total personality. The distinction between a dormant and an active neural pattern is more obvious and definite. But many neurograms remain dormant during waking periods, and conversely many neurograms are active during sleep. A person as a whole is said to be asleep when the neurograms concerned in thought, speech, and locomotion become dormant or inactive.

The problem now becomes: Why do neurograms go to

[2] Edouard Claparède, "Enquisse d'une théorie biologique du sommeil," *Archives de Psychologie,* 4 (1905), 245-349.

sleep? According to one view, neurograms are kept in readiness to respond by nerve currents originating in muscular tension.[3] There is a constant stream of neural energy carried to the brain over the dorsal columns of the cord from kinesthetic sense organs. This neural energy keeps the neurograms awake and ready to respond to nerve currents from other sense organs or from other neurograms. In sleep *the muscles relax,* the continual stream of neural energy from the kinesthetic senses is removed, and consequently the neurograms become less ready to act. Other stimuli have therefore no effect, unless they are unusually intense. An intense stimulus may set off a neural and ultimately a muscular response. The renewed muscular tension in turn arouses other neurograms, and the subject becomes more fully awake. This takes place the more readily, since the neuromuscular mechanism has become more responsive as a result of rest.

A practical implication of this theory is that relaxation induces sleep. It is, however, difficult to learn to relax, since effort to relax is itself a form of tension. A person cannot relax or go to sleep by making an effort to do so. The effort produces more tension and makes him more awake. He might perhaps use his imagination rather than his will as suggested by Coué, and merely picture himself as already relaxed or relaxing.

Another theory of sleep is the *circulatory theory.* According to this view, sleep is due to withdrawal of the blood supply from the brain.[4] This is a result of dilation of the vessels of the periphery. The blood flows away from

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[3] H. M. Johnson, "An Essay toward an Adequate Explanation of Sleep," *Psychological Bulletin,* 23 (1926), 141-142.

[4] W. H. Howell, *Text-Book of Physiology* (Saunders, 10th edition, 1917), Chap. xiii.

the brain into these vessels. The dilation of the peripheral blood vessels is consequent upon fatigue of the vasomotor center in the medulla. There is experimental evidence that these peripheral vessels are dilated during sleep, and the inference that there is less blood in the brain may probably be correct.

A number of theories of sleep refer to *changes in brain cells or synapses*. According to one view, sleep is due to "an amœboid shortening of the dendrites," thus increasing the space between neurons and consequently increasing resistance to the passage of nerve currents. Another view holds that there is "relaxation of neuroglia fibrils," thus blocking the synapses. Still another maintains that sleep is due to "accumulation of toxic waste products," probably in the synapses. Finally, there is a view that sleep is due to "consumption of nerve food supply" in the cell bodies, and consequent reduction in neural irritability. A combination of the chemical, circulatory, and relaxation theories seems to be necessary for a complete and satisfactory account of sleep.

Abnormalities of sleep.—These are extreme variations in the degree and amount of sleep. *Insomnia* is perhaps the most common abnormality. It may occur as broken and restless sleep, as wakefulness during the first part of the night, or as wakefulness during the last part of the night. Insomnia is due to a variety of causes, notably, mental conflict, anxiety, emotional excitement, unsatisfied desire, pain, visceral disturbances, and a fixed idea of inability to sleep.

Probably the most common and effectual causes of insomnia are indigestion, constipation, and intestinal gases. Next in importance are emotional disturbances and worries. Any incident which touches upon or stimulates

fundamental impulses, personal interests or aversions may result in a sleepless night. Such emotional upsets involve autonomic disturbances, and sleeplessness may be consequent upon these. A closely related cause of sleeplessness is the pressure of unsatisfied impulses and desires. Any form of play which satisfies these drives is therefore likely to induce sleep. A person may also remain awake because he has formed the habit of insomnia and has a fixed idea that he cannot sleep. He may worry about staying awake, which likewise prevents sleep. Perhaps the best way to go to sleep is to allow the mind free rein, or to think about things which have no connection with personal interests and feelings.

Somnambulism is a form of partial waking during sleep. The term means "sleep-walking," but it may also be applied to other forms of motor activity occurring during sleep, such as talking and the frequent changes of position referred to above. All the movements occurring in sleep are due to the activity of certain neural patterns, which are therefore not asleep. These neurograms may be simple ones, as those involved in changes of position; or they may be complex ones, like those involved in talking, walking, or carrying out complicated acts. Cases are on record of persons who have solved mathematical problems and have written letters during sleep. Such phenomena are analogous to automatic writing and other forms of dissociated personality. They are forms of dissociation arising during sleep.

Nocturnal enuresis may sometimes be analogous to somnambulism. It is an automatic activity of the urinary mechanism during sleep. Enuresis may, of course, have definite somatic causes; or it may be a result of inadequate training in the habit of bladder control. But it is

also at times the result of dissociation and independent activity of the neural mechanism involved, as in sleep-walking. Thus it may be a neurotic symptom occurring in nervous children, psychoneurotic adults and epileptic patients.

Somnolence or excessive sleepiness is another form of abnormality of sleep. Irresistible attacks of drowsiness occur in epilepsy and in hysteria. Sleep in such cases may be a flight from reality, a means of escaping an unpleasant experience or an undesirable task. A period of sleep always occurs in a dissociated personality during the transition from one state to another. A more serious form of somnolence occurs in "sleeping sickness," which is characterized by a gradually increasing stupor often terminating in death. The cause of this disease is not definitely known. One form of it occasionally follows influenza, while another form is the terminal stage of trypanosome infection.

A peculiar form of *paralysis* sometimes occurs during drowsiness or in the hypnagogic state. It takes the form of a transitory inability to move the limbs or the head, or even to open the eyelids. It is probably due to some form of dissociation involving the motor neurons, and is analogous to the functional paralysis of hysteria.

DREAMS

Description of the dream experience.—Freud has distinguished between the "manifest content" and the "latent content" of a dream. The manifest content is the dream as it is experienced, while the latent content is its meaning, which can be ascertained by psychoanalysis. In this section is given a brief description of the manifest content of dreams. In the first place, the dream is a form

of *undirected thinking* analogous to revery and free association. The dream is thus illogical and bizarre, but not more so than the sequence of images and ideas in free association. The dream differs from ordinary revery chiefly in the fact that phantasy is mistaken for reality. Images and ideas are experienced as sensations and perceptions, and a dream is therefore analogous to hallucination.

The *sense content* of the dream is as varied as sensations and images. Visual imagery usually predominates. Scenes are presented in a more or less dramatic way as if on a stage. Auditory imagery is also common—voices or music may be heard. Kinesthetic imagery is likewise frequent; the dreamer experiences himself in motion, walking, talking, fighting, or perhaps even flying. The other kinds of imagery are perhaps less usual. Organic imagery may be found in the form of emotion or feeling. Gustatory and olfactory imagery also occur, as when one dreams of eating or drinking.

The specific incidents in the dream may be taken from events of the "dream day," that is the day preceding the dream, or from some *recent experience*. Sometimes events that were perceived subliminally during the "dream day" may be experienced vividly in the dream. For example, the writer once dreamed that he was at a place called Cotswold Junction. As far as he could remember he had never heard of such a place. On looking up a book that he had been reading the previous day, he found the word "Cotswold" in a column adjoining the one read. He had not consciously read this word but must have perceived it subliminally, since it would be quite within the field of vision when reading the adjacent material. The dream likewise often contains incidents derived from the *remote past*. Childhood experiences at home

or in school are frequently intermingled in the dream picture.

A great deal has been written regarding *dream symbolism*. Some writers deny its existence, while others regard it as a common but mysterious reality. Dream symbolism merely means that an idea or object is represented in a dream by an image that has been closely associated with it in past experience. A dream symbol is frequently a visual representation of a common verbal expression. For example, the expression "pigheaded" is used to mean stubborn; so in a dream a person regarded as stubborn may appear with the head of a pig. Similarly, if we visualize the meaning of such expressions as "catty," "foxy," and "strong as an ox," we experience symbolic images analogous to the many apparently strange creations of dreams. It is thus quite possible that love may be represented in a dream by a garden, since we often speak of a "garden of love." For a similar reason, primitive passion may be represented by a savage, a wild animal, or a prehistoric monster. In general, anything may be represented or symbolized in a dream by a closely associated idea which can be more easily visualized.

Theories of dreams.—Dreams have been a topic of interest since the dawn of civilization and no doubt even in prehistoric times. In ancient days, people were interested in their prophetic significance, and some persons specialized in the interpretation of dreams as predictive of future events. Even at the present day we have "dream books" written from this point of view. As a matter of fact, dreams have probably no more prophetic significance than reveries or other forms of undirected thinking. The real problem is how to explain dreams, what are their causes. Many theories have been proposed in answer to

this question, but only a few which are especially instructive will be given here. Fundamentally, the problem is a neurological one, but in the present state of our knowledge a satisfactory account cannot be given from this point of view alone. It must be supplemented by a psychological account, which of course merely gives the subjective aspect of neural processes that are not yet sufficiently well-known.

According to the *neurological theory,* a dream is a partial awakening. It is the activity of disconnected cells or neurograms that have remained in a state of relative irritability or readiness to respond. These neurograms are activated by nerve currents coming from sense organs or from other active neurograms. The ultimate causes of the nerve currents are stimuli affecting certain sense organs. These stimuli are usually organic, such as digestive, circulatory, or respiratory processes; but they may also be external, as light, sound, or changes in temperature. The problem arises, why do some neurograms respond rather than others? This may be because they are in a state of readiness to respond. Readiness to respond may ultimately be accounted for in physicochemical terms, but at present it is necessary to supplement the neurological account with a psychological theory. Thus, readiness may be the neurological aspect of an unsatisfied drive, or the result of such a drive.

Delage, a French writer on dreams, has summed up his psychological theory of dreams in the statement that the dream is a *perseveration of the unadjusted.*[5] This means that the dream is the working out of a problem which was unsolved during the day. The problem may

[5] Yves Delage, "Essai sur la théorie du rêve," *Revue Scientifique,* 1891, 2.

be either theoretical or practical. In either case, the mind cannot easily rest with an unfinished task, and so the mental processes continue during sleep, sometimes actually solving the problem. This theory may be brought into relation with the previous one by supposing that the neurograms concerned in the problem are the most irritable and therefore the most easily stimulated during sleep. Delage's theory is also interesting because it can be interpreted as stressing mental conflict. An unsolved problem is a mental conflict and a dream is therefore an attempt to solve such a conflict.

An interesting psychoneurological theory has been proposed by Horton. He has suggested that a dream is an *apperceptive trial and error*.[6] This means that a dream is a series of attempts to perceive and interpret a stimulus. These attempts are unsuccessful or only partly successful. A completely successful attempt, a correct interpretation of the stimulus implies a complete awakening. According to this theory, if a person has cold feet he may, in an attempt to interpret this sensation, dream that he is walking through the snow. Moreover, since the expression "to have cold feet" means metaphorically failure to undertake an obvious task, the subject may dream he is in a situation where he is embarrassed by such a failure. In any case, when his perception is correct, that is, when he actually perceives that his feet are cold, he is awake.

The theory of apperceptive trial and error is very well illustrated in the following dream which the writer had while sleeping in a Pullman car. "He is a little boy at home rocking a cradle in which his baby sister is

[6] See L. H. Horton, series of articles on dreams, in *Journal of Abnormal Psychology*, 10-16 (1916-1921).

sleeping. He rocks the cradle too rapidly and is chased out of the room by his mother. He is then in the kitchen churning with an old-fashioned dasher churn. He dashes it more and more vigorously, scattering drops of cream all over the floor. His mother appears and he runs out of doors. Then there seems to be an earthquake; the ground shakes and he is filled with fear. At this point he awakes and finds himself saying 'Oh, it is only this Pullman car.' " The scenes in this dream may be regarded as a series of attempts to interpret the rocking, jerking, and swaying movements of the train; and when an attempt was finally successful the subject was awake. The problem, however, still remains: Why were the stimuli interpreted in these ways rather than in other ways which would have been equally possible?

Horton's theory helps to explain a peculiar phenomenon known as "the inversion of time" in dreams. The dreamer is awakened by some noise such as the falling of a window, or the slam of a door. He has just been dreaming and it seems as if the noise that awakened him is also the cause of the dream. According to Horton's theory this is actually the case. The dream that precedes the awakening is merely a rapid series of attempts to apperceive the noise. Correct apperception means full awakening. The series of apperceptions that constitute the dream is possible in so short a time because the apperceiving ideas were already prepared by past experience. For example, if the person first dreams that he is on the field of battle, this means that the "door slam" aroused, through association, ideas and images pertaining to a situation actually experienced or read about. This occurs immediately before correct perception of the stimulus, that is, before waking, or rather during the process of waking. Horton

gives the theory a neurological interpretation. The nerve currents from the sense organs involved, shoot through first one set of neurograms and then another until they are released in an adequate response to the situation.

The theory advanced by Sigmund Freud is the outstanding attempt to account for the detailed content of dreams as well as their general form and occurrence.[7] This theory may be summed up briefly in the statement that *a dream is a symbolical fulfillment of repressed infantile sex wishes.* Freud distinguished between the manifest and the latent content of the dream, and pointed out that the manifest content is symbolical of the latent sexual wishes. These sexual wishes are really of a childish or undeveloped nature. They are repressed autosexual, homosexual, incestuous, or exhibitionistic wishes rather than the customary heterosexual wishes of adult life. Such repressed wishes are manifested in a much distorted allegorical form in the dream. The distortion is brought about by certain definite distorting mechanisms which are described below. The real meaning of the dream, the latent content, can only be determined by a long process of psychoanalysis.

The Freudian theory stresses important factors in the explanation of dreams, but it is too narrow to account for all dreams. The term "wish" may be understood to mean impulse or drive, and the theory may be extended so as to include other drives as well as the sexual. A dream is thus *an expression of unsatisfied impulses.* These impulses may be sexual, egoistic, nutritive, social, pugnacious and what not. The impulses may be expressed symbolically, that is, they may be represented by asso-

[7] Sigmund Freud, *The Interpretation of Dreams,* translated by A. A. Brill (Macmillan, 1912).

ciated ideas and images. This extension of the Freudian view throws considerable light on the meaning of dreams, but even this broader view fails to explain all dreams.

The so-called *distorting mechanisms* mentioned by Freud also contribute to the understanding of dreams. These mechanisms are condensation, displacement of affect, dramatization, and secondary elaboration. Condensation means that the dream image may at the same time represent a number of different impulses or ideas. This may be illustrated by a dream in which an old man, gray-bearded and decrepit, was seen standing near a ruined castle by the sea. An analysis of the dream indicated that this old man represented the following ideas: Neptune, Father Time, the dreamer's father, senility, weakness, and the dreamer's own shortcomings. Condensation thus means that the dream image has a plurality of causes, it is "overdetermined." The same is true of neurotic symptoms and this is why a number of entirely different accounts of their origin may be given, and may all be right.

Displacement of affect means the transference of feeling or emotion from one element of the dream to another. The affect is usually transferred from an important to an unimportant element of the dream. It follows that the parts of a dream which seem most important are often really the least important, and the parts which are unimportant and likely to be overlooked often furnish the clew to an understanding of the dream. The latter are the items which the dreamer usually regards as irrelevant and fails to report in telling his dream.

Dramatization means visualization, projection, and scenic presentation. There seems to be a pronounced tendency towards visual imagery in dreams. Even sensa-

tions from other senses are frequently presented to consciousness in visual terms. For example, a woman who dreamed that she saw herself with a bald head, woke up to find that her head was in a draft and feeling cold. The cold sensation was interpreted in visual terms. The visualization of verbal expressions in symbolism has already been mentioned, and projection was described in the previous chapter. The dream is a particularly fine example of projection; for everything in the dream is merely an external manifestation of the dreamer's own mental processes.

Secondary elaboration is the attempt of the dreamer to make the manifest content appear intelligible. He reads logic and coherence into the dream where they do not exist. This is done especially in telling a dream. It is impossible to tell a dream without making it more logical than it really was.

The theory that a dream *represents a mental conflict* has been suggested by various writers, and particularly by Rivers.[8] According to Freud a dream represents a repressed wish or impulse. The repression of an impulse is a result of mental conflict. There are always two sides to a conflict, and it is reasonable to suppose that the dream may represent both sides and not only the repressed one. A dream thus expresses two conflicting wishes, a conscious wish acceptable to the waking personality and an unconscious or repressed wish not so readily acceptable. In other words, the dream represents both socialized and primitive impulses.

Conflict in dreams is very well illustrated by the common dream in which one is chased by a wild animal but,

[8] W. H. R. Rivers, *Conflict and Dreams* (Harcourt, Brace, 1923).

notwithstanding great effort, is unable to run—the legs seem weak and paralyzed. In this dream the animal represents primitive impulse which one wishes to escape and at the same time wishes to gratify. In the dream he satisfies both desires. He does his best to get away and at the same time yields through physical weakness. A similar interpretation may be given of the dream in which one is struggling to climb a hill but is leg-weary and cannot reach the top. This dream may represent conflict between aspiration and physical inertia or, as Jung would put it, between the progressive and regressive trends of the libido. It pictures the desire for achievement and at the same time the desire for security, physical comfort, and the irresponsibility of childhood.

The same dream may represent a number of different conflicts in accordance with the principle of overdetermination. It may represent conflicts at different stages of development, as for instance a present conflict, a conflict of adolescence, and one of childhood or even of infancy. These various conflicts are brought out usually in the above order in the process of dream analysis. A dream thus represents both the present and the past. Sometimes a dream affords a satisfactory solution of the conflict. Bjerre holds that a dream is always an attempt at solution or psychosynthesis, and that the feeling of mental refreshment after sleep depends largely upon the success of this attempt.[9] This brings the present theory into close relation with Delage's theory stated above. In fact, each theory contributes something to the understanding of this interesting phenomenon, and in conjunction they give a fairly satisfactory explanation of most of our dreams.

[9] Poul Bjerre, "The Way to and from Freud," *Psychoanalytic Review*, 12 (1925), 39-66.

The relation of dreams to other phenomena.—The relation of dreams to reveries, phantasies, and free association has already been mentioned. Dreams are also related to poetry, particularly to lyric poetry. *Poetry,* like the dream, is the expression of repressed impulses and conflicting emotions. In poetry also the conflict is expressed in symbolical or allegorical form. The chief difference between poetry and dreams is that poetry has form as well as content. In other words, poetry conforms to certain conventional standards and logical requirements that are wholly lacking in a dream. But a poem like Coleridge's "Ancient Mariner" is so obviously dreamlike that it might well be interpreted in accordance with the principles of dream interpretation. The difficulty is that the author is not here to be analyzed. A partial analysis might, however, be accomplished by a psychological study of his life history as revealed in biographies.

Dreams are also related to some *neurotic symptoms,* which may therefore be explained in the same way. The psychoneuroses are frequently consequent upon mental conflict, and the symptoms are often manifestations of this conflict. Dreams are especially closely related to hallucinations, and the content of hallucinations may be interpreted just as if they were dreams. This does not mean that hallucinations may be altogether accounted for by mental conflict. There are usually other factors of a more definite organic nature which may account for the fact and form of hallucination, just as dreams are usually caused by external or internal stimuli. But the content of hallucination is analogous to the manifest content of a dream. The same is true of the content of many delusions, or strange and false beliefs, previously described.

Dreams are closely related to *waking life.* They get

their material from the experiences of the dream day, or of the more remote past. They may also affect the waking consciousness of the following day. Morning thoughts are often closely related to the night's dreams and usually have the same meaning. The writer has found that snatches of poetry which he frequently thinks of in the morning nearly always pertain to his dreams and have the same latent meaning. The dream is the royal road to self-knowledge. It is an excellent starting point for psychoanalysis. It reveals the self to the self, and the problem is to understand the meaning of the revelation.

Abnormal dreams.—The average person dreams occasionally. It may thus be regarded as abnormal to dream excessively or not to dream at all. Excessive dreaming is probably due to physical disturbances, to a hypersensitive nature, or to the presence of mental conflicts and unsatisfied impulses; while absence of dreaming is due to the opposite factors. The most common abnormal dream is the "anxiety dream" which is analogous to the nightmare, and to the "night terrors" of children. Such dreams are the result of marked physical disturbances, an unusually nervous condition, or some important but unsolved mental conflict.

The *anxiety dream* represents the mental conflict, and partly fulfills or suggests the fulfillment of some unacceptable desire. The anxiety, fear, or terror is the "defense reaction" of the dreamer against the fulfillment of his own unethical or undesirable impulse. It is significant that nightmares occur most frequently during the preadolescent period, when conflict between ideals and primitive impulses is particularly intense. Thus an unpleasant dream may also be "wish-fulfilling" in the sense that it is the expression of an unsatisfied impulse. But the impulse is in

conflict with the subject's ideals, and he therefore both wishes for and objects to its satisfaction. The fear represents the objection to a repressed desire about to be consummated.

CHAPTER XXIV

INTELLIGENCE AND INTELLECT

The terms "intelligence" and "intellect" are common in popular language. They are used in many different senses which are not always clearly distinguished. Intelligence sometimes means information, as in the phrase "The Intelligence Department of the Army." At other times it means ability to acquire skill or knowledge, as when we speak of an intelligent child in school. The term "intellect" also has various meanings, such as reasoning power, understanding, or knowledge. In psychology, it is desirable to limit the application of such terms and give them more definite meanings. These meanings are not necessarily identical with the popular conceptions.

The nature of intelligence.—There are many different views among psychologists regarding the nature of intelligence.[1] Binet held that intelligence included the power of attention, of adaptation, and of self-criticism. Ebbinghaus believed that the essence of intelligence was *synthetic or combinative ability,* that is, ability to associate or connect mental processes into new patterns. Stern defined intelligence as the "general capacity of an individual consciously to adjust his thinking to new requirements." In other words, intelligence is *general adaptability* to new problems and conditions of life. This is a very concise

[1] For a short statement of theories and for bibliography, see W. F. Dearborn, *Intelligence Tests* (Houghton Mifflin, 1928).

definition and is consequently one of the most frequently used.

Thorndike and others have held that intelligence is not itself a special mental function but is rather the *sum or average of all specific abilities*. It is a *tout ensemble* of abilities. But these abilities are not all of the same value in intelligence. They may be arranged into a hierarchy with associative functions at the top and simple sensory-motor processes at the bottom of the scale. Thus, judgment and reasoning are more important abilities in intelligence than memory, and memory is more important than sensory discrimination or motor coördination.

The specific abilities are correlated more or less closely. In other words, if a person is good in one he is likely to be good in others, and if he is poor in one he is likely to be poor in others. The correlation is closer among the higher abilities, and less close among the lower functions and between the lower and the higher functions. The correlation of abilities is due to their overlapping, and the degree of correlation depends upon the number of elements common to the abilities concerned. These common elements are fundamentally the common neurograms involved in the processes.

Spearman has advanced the view that intelligence is a general or *common central factor* that participates in all sorts of special mental activities. According to this view, every ability depends upon two factors, one specific and the other general. The general factor is intelligence. For example, mathematical ability depends upon specific aptitude for mathematics and also upon general intelligence. Likewise, linguistic ability depends upon specific aptitude for language and upon general intelligence. Thus, general intelligence enters into all abilities. It is a common

factor in abilities and accounts for the correlation among them.

The higher the correlation between two abilities, the more they partake of this common factor; and the lower the correlation between them, the less they partake of the common factor and the more they partake of specific factors. Mathematical and linguistic abilities may be largely dependent upon specific factors, but even such apparently different abilities depend to a considerable extent upon the common factor, for they show some correlation. Good mathematicians are, on the whole, better linguists than are poor mathematicians, and, similarly, good linguists are better mathematicians than are poor linguists.

Perhaps the most satisfactory definition of intelligence is that it is *capacity to learn.* This means capacity to acquire skills, ideas, and other mental processes, and to make new combinations among them. The capacities to acquire and to combine are perhaps fundamentally and neurologically the same capacity. They are both reducible to formation of associative bonds. Acquisition of an idea is formation of simple associative connections or simple neurograms, while combination of ideas is formation of associative connections between neurograms, thus creating more complex neural patterns. The capacity to learn is no doubt mainly innate and inherited. It depends chiefly upon an innate characteristic of the nervous system. But it is also determined in part by environmental conditions which affect the general health and nutrition. The capacity to learn must be distinguished from knowledge, information, and skill, which are acquired as a result of this capacity together with interest and opportunity.

The view that intelligence is capacity to learn is not

incompatible with some of the theories mentioned above. Adaptability, emphasized by Binet and Stern, is a form of learning capacity. It is the ability to learn to adjust to new situations. The combinative ability of Ebbinghaus is likewise a form of learning ability. It is the capacity to make new associative bonds of a particular kind. Furthermore, capacity to learn may be a common central factor depending upon a general fund of neural energy in accordance with the theory of Spearman; or there may be a number of specific capacities to learn in accordance with Thorndike's view. In other words, there may be a single unitary capacity to learn, or a number of different capacities to learn different things.

The theory that intelligence is capacity to learn is, moreover, in conformity with popular usage. For example, when we speak of an intelligent dog we mean a dog that can easily learn new tricks, one that can be readily trained. Likewise, when we speak of an intelligent child we usually mean a child who progresses rapidly in school or in the acquisition of skill and social behavior. It is true that "an intelligent adult" usually means not only a person who can easily acquire new knowledge and skill, but one who can produce original ideas or inventions. Originality, however, may be regarded as ability to combine mental processes into new patterns, which is likewise an aspect of the capacity to learn.

Kinds of intelligence.—It is probable that learning capacity is not merely a single or unitary central factor. There seem to be different learning capacities for different things. A person may have good ability to learn mechanical skill and poor ability to learn science. Or he may have good ability to learn physics and poor ability to learn social behavior. Some of these specific learning

capacities are more highly correlated than others. The correlation depends upon the similarity of the learning processes. It is due to common elements in the learning. For instance, there are more common elements in learning arithmetic and algebra than in learning arithmetic and Latin. Consequently, the correlation between learning arithmetic and learning algebra will be higher than the correlation between learning arithmetic and learning Latin. The more closely related learning capacities may be grouped together and referred to as "kinds of intelligence." Minor groups of such capacities may be included in major groups. Three of these major groups are cognitive intelligence, affective intelligence, and conative or motor intelligence.

Cognitive intelligence or cognitive learning capacity is capacity to acquire ideas, information and knowledge, and to make new ideational combinations. This is the kind of intelligence necessary for progress in school and for academic achievement. *Affective intelligence* or affective learning capacity is capacity to condition, modify and combine feelings and emotions, to develop compound emotions such as enter into sentiments, and to acquire emotional control. This form of intelligence is necessary for development of satisfactory personal relations and desirable social attitudes. *Conative intelligence* is, objectively, motor intelligence. It is capacity to condition reflexes and instincts, to coördinate motor responses into habits, and to acquire technical skills and social behavior. Subjectively, it is capacity to modify, condition and coordinate impulses. This form of intelligence is necessary for acquisition of mechanical and other skills, and for development of character.

These three kinds of intelligence are all important, and

it is a mistake to exaggerate or belittle any of them. The importance of cognitive intelligence is usually stressed by students and persons with only academic interests. Motor intelligence is of equal if not greater importance in art, in industry and in domestic activities. Acquisition of the fine skill involved in drawing, playing a violin, sewing, crocheting and cooking involves intelligence of a high order. Similarly, the intelligence involved in the modification and training of feelings and emotions, and in the formation of sentiments is essential for personal development and social relationships. He would be a very inferior person who possessed only a high degree of cognitive intelligence, and lacked affective and conative intelligence. The intelligence which enables a student of medicine to acquire surgical skill is as important as that which results in medical knowledge, and the intelligence which enables him to attain a satisfactory emotional adjustment and consequently a desirable attitude towards colleagues and patients is perhaps the most important of all.

Intellect.—Intellect is the sum-total of ideas and their organization. It must be distinguished from cognitive intelligence which is capacity to acquire these ideas. The development of intellect may begin with simple sensations and images. These are associated and organized into perceptions and ideas, which are further organized into general information and special knowledge, as knowledge of physics, chemistry, or psychology. All general information and systems of knowledge may be further organized into a "scientific world-view."

Complete cognitive organization is, of course, only an ideal which few persons actually attain. Usually many ideas and groups of ideas are not organized into any

system of knowledge, and it is rare that all systems of knowledge are completely integrated into a scientific world-view. The organization involved in intellect is fundamentally a matter of association of ideas. Neurologically, it is no doubt the formation of connections among cortical neurons and neurograms. These neurograms become arranged into a hierarchy of more and more complex neural patterns.

Intellect develops very gradually throughout the lifetime of the individual, probably up to the beginning of senile deterioration. The development of intellect depends upon: (1) intelligence, which is mainly an innate capacity; (2) environmental influences, especially opportunities for education; and (3) a fundamental driving force, energy or "libido," which may be possessed in varying amounts and directed into intellectual channels. Intellect is thus an achievement and, like other achievements, is dependent upon *intelligence, opportunity,* and *drive*. Opportunity and drive have not been sufficiently emphasized in the psychology of achievement. Without opportunity, intelligence could not function, and without drive to provide a motive, a person would make ineffective use of his intelligence and would fail to take advantage of his opportunities.

Intelligence tests.—The historical antecedents of mental tests were the experiments of the psychological laboratory. These experiments pertain to more elementary mental functions than those which the tests propose to measure. Tests were first devised to measure special mental abilities, such as sensory capacity, motor capacity, and memory. Tests of this type were developed by Galton and Cattell. The first scale of tests for the measurement of intelligence was devised by Binet and Simon and pub-

lished in 1908.[2] This scale was intended for measurement of the intelligence of school children. The tests were arranged in "year groups" for each year of age from three to thirteen inclusive. Each year group includes tests which the average child of that age can do. They are too difficult for the year below and too easy for the year above. The Binet-Simon scale was devised to select pupils for classes for backward children in the schools of Paris. It has been found satisfactory for this and other purposes, and in its various modified forms has been very extensively used.

The *Binet-Simon scale* has been translated into many languages and has been modified, extended and revised as the result of further investigations. Perhaps the most frequently used form of this scale in America is the one devised by Terman and others, and called the "Stanford-Binet scale." In this scale the tests are also arranged in year groups. There are six tests in each group from the third to the tenth year, eight tests for year twelve, and six tests each for years fourteen, sixteen, and eighteen. No tests are provided for years eleven, thirteen, fifteen, and seventeen; but persons of these ages may nevertheless be accurately rated on the scale. Since there are six tests in each year group up to ten years, every test counts two months on the score. Each test in the twelve-year group counts three months, while the tests in the upper three groups have various values bringing the maximum score on the scale to nineteen years and six months. The tests for years three, six, and nine are given below as illustrative of the scale.[3]

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[2] Alfred Binet and Théodore Simon, *The Development of Intelligence in Children*, translated by E. S. Kite (Vineland Training School, 1916).

[3] L. M. Terman, *The Measurement of Intelligence* (Houghton Mifflin, 1916).

Year III

1. Points to parts of the body—nose, eyes, mouth, hair.
2. Names familiar objects—key, penny, knife, watch, pencil.
3. Enumerates objects in pictures.
4. Gives sex.
5. Gives last name.
6. Repeats 6-7 syllables. (*a*) I have a little dog. (*b*) The dog runs after the cat. (*c*) In the summer the sun is hot.

Year VI

1. Shows right hand, left ear, right eye.
2. Indicates the missing part in mutilated pictures.
3. Counts 13 pennies.
4. Comprehends sentences. What's the thing to do:
   (*a*) If it is raining when you start to school?
   (*b*) If you find that your house is on fire?
   (*c*) If you are going some place and miss your car?
5. Knows coins—nickel, penny, quarter, dime.
6. Repeats 16-18 syllables.
   (*a*) We are having a fine time. We found a little mouse in the trap.
   (*b*) Walter had a fine time on his vacation. He went fishing every day.
   (*c*) We will go out for a long walk. Please give me my pretty straw hat.

Year IX

1. Gives date—week, month, day of month, year.
2. Arranges weights in order of heaviness—3, 6, 9, 12, and 15 grams.
3. Makes change: 10 — 4, 15 — 12, 25 — 4.
4. Repeats 4 digits backwards: 6-5-2-8, 4-9-3-7, 8-6-2-9.
5. Uses three words in a sentence. (*a*) Boy, river, ball; (*b*) work, money, men; (*c*) desert, rivers, lakes.
6. Gives three rhymes for each word—(*a*) day, (*b*) mill, (*c*) spring.

In giving these tests a uniform procedure must be followed. This procedure should be exactly the same for every subject. It is clear that the difficulty of a question or a test will vary with the way in which it is asked or given. A standard procedure has therefore been carefully worked out, and must be learned by any one who would make use of the scale. Rules for scoring the tests have also been prepared and should be closely followed in evaluating the performance of a subject. The complete Stanford-Binet scale with standard methods of procedure and rules for scoring is given in Terman's book, *The Measurement of Intelligence.*

A *point scale* for measuring mental ability was devised by Yerkes, Hardwick and the present writer.[4] This scale consists of twenty tests, each subdivided into a number of items. A point or more credit is assigned to each item of the scale. The total number of points obtainable is one hundred. The subject is given these twenty tests and awarded points for the items successfully performed. The total score thus obtained may be compared with the average or median score made by subjects of the same age. The tests used are for the most part the same as those in the Binet scale but the method of assigning credit is different. The point scale can usually be given in less time than the Stanford-Binet, and it is a satisfactory method of measuring the mental development of children up to twelve years of age. The point method has some historical significance, for it was the introduction of this method which opened the way for the development of "group scales" for measuring mental ability. Group scales must obviously be point scales.

[4] R. M. Yerkes, J. W. Bridges and R. S. Hardwick, *A Point Scale for Measuring Mental Ability* (Warwick & York, 1915).

The tests described place considerable emphasis upon language. They require the use of language by both examiner and subject examined. But there are abilities that do not involve language and are consequently not measured by these scales. Tests to measure such abilities have therefore been devised. These are called "performance tests" or "non-language tests." A series of performance tests was described by Healy and Fernald.[5] These are separate tests to be given and evaluated independently. The evaluation is partly quantitative but chiefly qualitative.

A *scale of performance tests* was later devised by Pintner and Paterson. In this scale the tests are arranged in year groups in accordance with the Binet method, but they may also be scored in points in accordance with the point scale method. Several of these tests are shown by way of illustration in Figure 25. In some cases the blocks must be fitted into the spaces, and in other cases the pieces must be put together in such a way as to make or complete a form or picture. The tests are shown fitted together properly. The number of moves and the length of time required for the performances indicate the mental development of the subject. An exact standard procedure in giving and scoring performance tests is even more important than in tests of the Binet type. The Pintner-Paterson scale with methods of procedure and scoring is described by the authors in their book entitled *A Scale of Performance Tests*.[6] Many other performance tests have been devised. The writer and A. S. Otis prepared a scale

[5] William Healy and G. M. Fernald, "Tests for Practical Mental Classification," *Psychological Review Monograph*, Vol. 13 (1911), No. 54.

[6] Rudolph Pintner and D G. Paterson, *A Scale of Performance Tests* (Appleton, 1917).

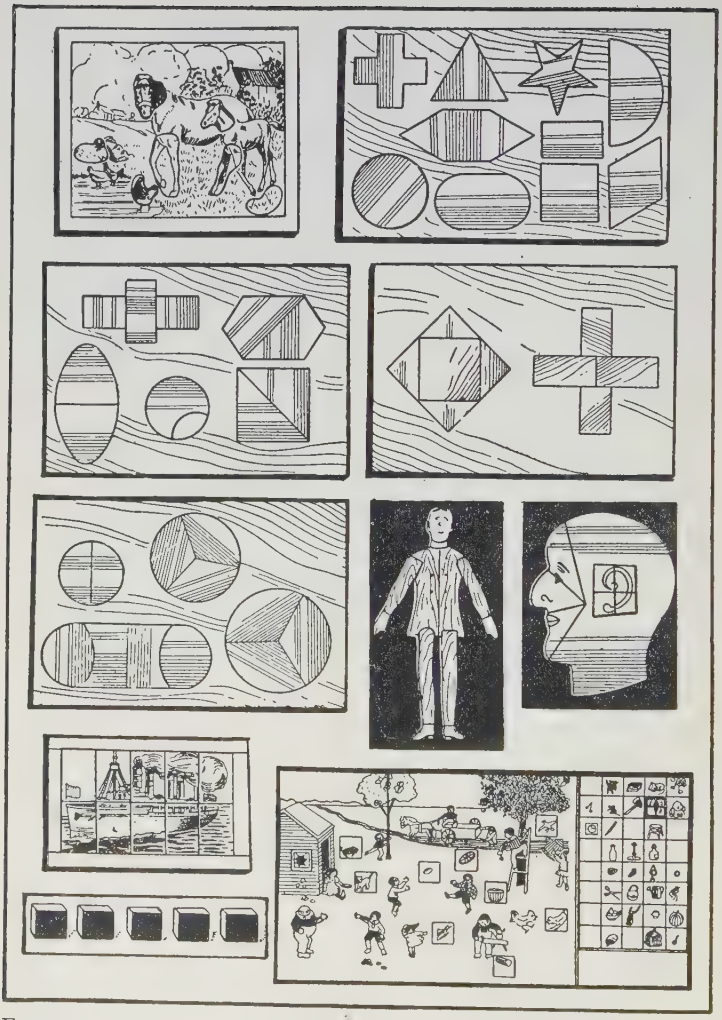

FIG. 25. THE "SHORT SCALE" OF THE PINTNER AND PATERSON PERFORMANCE TESTS
(Courtesy of C. H. Stoelting Co.)

of such tests for individual examination of soldiers in the United States Army during the World War.[7]

The tests described above are all individual tests. They can be given only to one person at a time. It would obviously be a great saving of time if tests could be given to a large number of subjects at once. *Group tests* have been prepared for this purpose. Such tests were used extensively in examining soldiers in the United States Army during the Great War. They have since been adapted for use in primary and secondary schools and even in universities.

The first group tests involved the use of language. Language tests are obviously not satisfactory for foreign or illiterate subjects. *Non-language group tests* have therefore been devised. These usually consist of pictures of various sorts. For example, in one test the subject is required to find the missing parts in pictures and indicate them by pencil marks. The non-language group tests are thus pencil and paper tests, but they can be given and taken without the use of spoken or written language.

The procedure in group tests has been carefully standardized, and scoring rules have been prepared. Both procedure and scoring are made as simple as possible. The object is to have a test which any person can give who has spent a few hours in studying the directions. Tests may thus be given by teachers to their pupils, and by others to any groups of children or adults. There are now a great many group tests available, some for use in elementary schools, others for use in high schools and still others for use in universities.

[7] This scale may be found in *Memoirs of the National Academy of Science*, Vol. XV (1921).

Results of the tests.—There are different ways of expressing the results of tests. One of these is known as "mental age," which indicates the degree of mental development shown by the tests. A person is said to have a certain *mental age,* if his performance on the tests is equal to the average performance of a number of children at that chronological age. For example, if a child can do the six-year group of tests but cannot do the seven-year group, his mental age is six years regardless of what his actual chronological age may be. It is obvious that a mental-age score has significance only if the subject's chronological age is also known.

The result of an intelligence test may also be expressed by an *intelligence quotient.* This is obtained by dividing the mental age of the subject by his chronological age. For example, if the mental age is six and the chronological age is five, the intelligence quotient will be 1.20 (usually written 120). In the case of a person sixteen years of age or more, the intelligence quotient is obtained by dividing the mental age by sixteen on the assumption that the abilities measured by the test do not improve much after sixteen years of age. An intelligence quotient indicates the ability of the subject regardless of his actual age.

In the case of the point scale and the group tests, the results are expressed in terms of *points.* The score made may then be compared with a list of the average scores of children at different ages, and a mental age may be thus obtained. The score made may also be converted into a percentile rank. A *percentile rank* indicates the percentage of persons of the same age that the subject exceeds in ability. For example, a percentile rank of 65 means that the subject exceeds 64 per cent of persons at that age, and is inferior to 35 per cent. Thus a percentile rank

definitely places a subject with reference to the other members of his group, and is therefore a very satisfactory method of indicating relative ability in the traits measured.

The results of tests on large groups of persons show that the abilities measured are distributed among the population at large in conformity with the normal curve. This is illustrated by the diagrams in Chapter II. There are thus very marked individual differences in performance on the tests. The intelligence quotients range from nearly zero to almost 200. Terman has suggested the following classification of subjects based upon intelligence quotients:

Classification	*Score (I.Q.)*
Genius, or near genius	above 140
Very superior	120-140
Superior	110-120
Normal or average	90-110
Dull or backward	80-90
Border-line deficiency	70-80
Definitely feeble-minded: (*a*) Moron	50-70
(*b*) Imbecile	20-50
(*c*) Idiot	below 20

The scores obtained on the tests vary considerably from grade to grade in school. They may therefore be used as a rough indication of the grade to which any given pupil should be assigned. The scores also increase progressively with age during the years of childhood and early adolescence. They show very little increase after sixteen to eighteen years on the scales now in use. The relation of scores on the point scale to age is shown by the diagram in Figure 26. The vertical line indicates the score made,

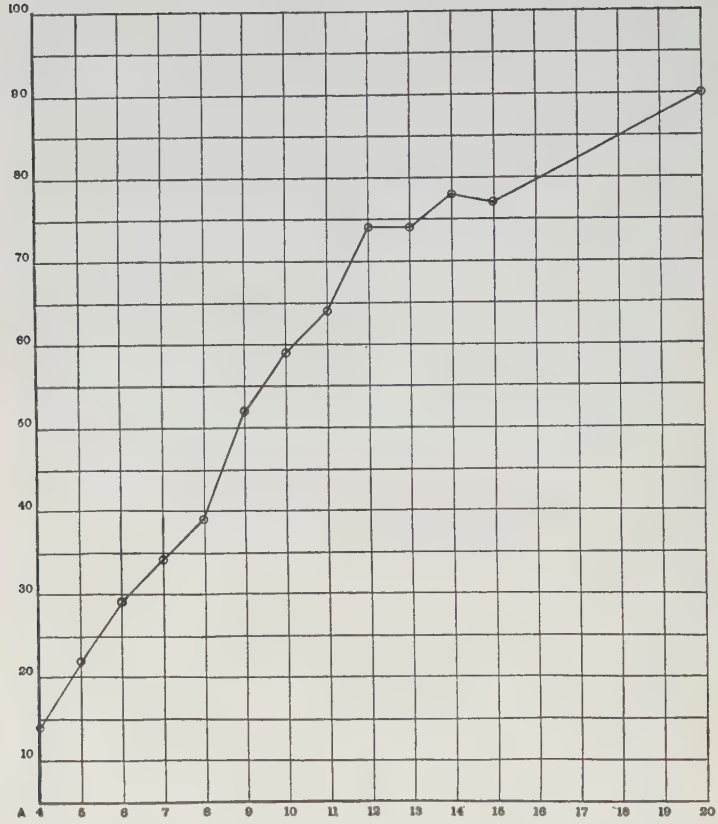

FIG. 26. RELATION OF SCORES ON THE "POINT SCALE" TO AGE

The horizontal axis indicates age in years, the vertical axis score in points. Results for 751 individuals. (From Yerkes, Bridges, and Hardwick, *A Point Scale for Measuring Mental Ability,* Warwick & York, 1915.)

and the horizontal line age in years. It will be noted that consistent increase in score stops at age twelve. The point scale is thus of value in measuring development only up to that mental age.

Many interesting results have been obtained from the application of tests to various special groups, such as

occupational groups, delinquent children, criminals, racial groups, and so forth.[8]

What the tests measure.—In the beginning it is important to distinguish between two questions; namely, what do the tests measure, and what can be inferred from the measurements? These two problems will be considered separately. The obvious answer to the first question is that the tests measure just what they measure. For example, the test for "repeating digits backwards" measures ability to repeat digits backwards. Similarly, "the penny counting test" measures ability to count pennies; "the comprehension test," ability to comprehend sentences; the "weights test," ability to arrange weights in order, and so forth. Many persons are not satisfied with this statement and seem to believe that the tests measure some mysterious factor not apparent on the surface. A further analysis might of course be given, as that "the digits-backwards test" measures ability to remember and attend to digits and their sequence long enough to repeat them in inverse order.

It is furthermore clear that the tests measure an ability as it is at the moment, regardless of whether it is the product of heredity or environment. One of the most common mistakes regarding so-called intelligence tests is to suppose that they measure innate ability. The abilities measured by the tests are really no more innate than is knowledge of anatomy or chemistry. These abilities may be in part a result of innate factors, but there is nothing in the tests themselves to indicate that they are. This is just as true of performance and non-language tests as of language tests. The performances involved are always

[8] For a concise statement of results on these groups, see Rudolph Pintner, *Intelligence Testing* (Holt, 1923), pp. 173-398.

acquired performances, although they may be acquired as a result of innate learning capacity. For example, a person could not put pieces together so as to make the picture of a ship unless he had previously seen a ship or a picture of one; and he could not fit blocks correctly into a space unless he had previous experience with blocks or similar objects and some practical knowledge of their geometric relations.

The tests therefore measure intellect and skill rather than native intelligence. Furthermore, since intellect and skill are roughly indicative of educational and social development, the tests may be regarded as measures of social and educational status. In sociology the term "culture" is used in a broad sense to include education, training, customs and all social traditions. It may thus be said that intelligence tests are rough measures of general *cultural status*. A person's cultural status is obviously the joint product of many causes, partly hereditary but chiefly environmental.

When we turn to the problem of what can be inferred from the tests, we become involved at once in the problem of the correlation of abilities. Other abilities can be inferred from results on a test only if they have been shown to correlate with the ability measured. Thus, inference from tests depends upon established correlations. Discussion of these correlations would take us too far afield. But the test results have been shown to correlate roughly with school progress and with other achievements, particularly along scholastic lines. Moreover, native intelligence may perhaps be inferred from scores on the tests, if it can be assumed that the opportunities and interests of the persons tested have been the same. This, however, is rarely the case. Opportunities differ greatly even for

persons within the same family, and effective drive is a still more variable factor.

The value of the tests.—As measures of social and educational status the tests have a very real value, particularly in primary schools. It is often important to obtain a more objective estimate of pupils' progress than can be obtained from ordinary school methods. The tests are of undoubted value in selecting pupils for special classes, particularly for backward children. They are likewise valuable in selecting pupils for promotion from one grade to another. They may also be used as a basis for the prediction of achievement, but should be used for this purpose with caution. Achievement depends upon other factors besides those measured by tests, notably the opening up of opportunities, and the various traits of temperament and character.

The tests have therefore a limited value in vocational guidance and the selection of employees. Studies have shown that the test scores vary considerably with different occupational groups. They increase progressively with the occupational scale in the order, laborers, tradesmen, clerical workers, and professional workers.

The tests are useful as an aid in the diagnosis of feeble-mindedness. But it must be remembered that the test method is only one device for this purpose. No person should be diagnosed as feeble-minded on the basis of test results alone. The personal, social, and educational history of the patient must also be studied, and a physical examination made. An intelligent person may make a very low score on an intelligence test if he has had poor opportunities for development, and if his interests are not along scholastic lines. The writer has examined intelligent

Kentucky mountaineers who scored only seven to eight years mental age on the Binet scale.

Intelligence tests have sometimes been used in the study of racial differences. They invariably show the superiority of the Nordic race in the scores obtained. It is sometimes inferred from this that the Nordic has an *innate* superiority over other races; but no such inference can be legitimately drawn from the results of the tests. These, as a rule, measure Nordic culture, and it is obvious that any race will show superiority in its own culture. Innate racial differences cannot be demonstrated by intelligence tests alone.

Abnormalities of intelligence.—Since intelligence means learning capacity, its abnormalities must usually be inferred from abnormalities in intellect, in skill, or in social behavior. These are products of both intelligence and training, and therefore the inference may often be incorrect. Intelligence may be supernormal or subnormal. Supernormal intelligence is one of the factors producing genius. A *genius* may be supernormal in most of his learning capacities and abilities, or he may be supernormal in only some few of them. As previously pointed out, abilities show a marked tendency towards correlation. Consequently, if a person is above the median in one ability he is more likely to be above than below the median in other abilities. Nevertheless, there are some geniuses who have very marked abilities in certain lines and who are at the same time rather deficient in other lines.

Subnormal intelligence is manifested in *stupidity* and at a lower level in feeble-mindedness or mental defect. *Feeble-mindedness* is really a social concept. It has been defined by the English Royal Commission on Mental Deficiency as follows: "A feeble-minded person is one who

is incapable because of mental defect existing from birth or from an early age (*a*) of competing on equal terms with his normal fellows, or (*b*) of managing himself or his affairs with ordinary prudence." Feeble-mindedness may thus involve deficiencies in affective and motor capacities as well as in intellect.

Three degrees of mental defect or feeble-mindedness are usually distinguished: moronity, imbecility, and idiocy. An adult *moron* has the intelligence of a child about seven to ten years of age. He can get along outside an institution if not markedly inferior in affective behavior and social adjustment, but he can do only routine work under supervision. The adult *imbecile* has the intelligence of a child about three to seven years of age. He can feed and clothe himself but he needs institutional care where he can work under constant supervision. The *idiot* has only the intelligence of an infant. He not only requires institutional care, but he may need assistance in such simple matters as eating and dressing.

In the case of children it is more difficult to distinguish between these different degrees of feeble-mindedness. It is sometimes done in terms of intelligence quotients. The moron has an I.Q. of 50 to 70, the imbecile 20 to 50, and the idiot below 20. This distinction is made on the basis of intelligence test results and is consequently not very reliable.

There are also various "clinical types" of feeble-mindedness which are determined and differentiated chiefly by their physical characteristics. This differentiation as well as the diagnosis of feeble-mindedness itself is a psychiatric rather than a psychological problem, just as the diagnosis of mental disease is a psychiatric problem.

Such diagnoses are based on other factors besides mental symptoms and results of mental measurements.

Occasionally a feeble-minded person may have relatively good ability in some special field. For instance, he may have good musical ability or good mathematical ability. Such persons are sometimes called *idiots savants*. They are far below the median in most of their abilities but are average or better in some one or two. They are analogous to those geniuses who are particularly stupid along certain lines. According to the statistical view of the distribution of amounts of different traits within the same person, every person is a genius in some things and an idiot in some others. In conformity with the theory of correlation, a person's traits tend to cluster around a particular level, but some traits scatter away from this point, and a few may be far down the scale and likewise a few far up the scale. In other words, every person has his assets and his liabilities. He is fortunate if his assets are such as may be economically or socially useful.

CHAPTER XXV

SPECIAL ABILITIES

All abilities may be special or "specific abilities." Even capacity to learn may consist of a number of specific learning capacities for particular things. But, on the other hand, it is possible that it may be a "general ability." Neurologically, the problem is whether the plasticity of the nervous system is a general one, or whether there are specific modifiabilities of special centers and systems of connections. Perhaps there are two kinds of learning capacity, one specific and the other general. The learning capacities together with simple sensory and motor capacities are the theoretical original abilities of the individual. Special abilities in everyday life are joint products of nature and nurture, and it is usually quite impossible to determine to what extent they are original or acquired.

We have numerous special abilities in this sense. Some of them are relatively simple mental functions, such as sensory capacity, attention, and drive. Others are more complex traits or qualities. The complex abilities are usually analyzable into simpler ones. Some of them are special forms of knowledge, as the knowledge of history and of medicine. Others are special skills, like juggling, typewriting, and surgical skill. Still others are forms of social behavior, including social manners and ability to get along with people. A few of these various abilities will be described briefly for purpose of illustration.

Some special abilities are measurable by means of tests.[1] But it must be emphasized again that tests measure abilities as they exist at the moment regardless of their origin. The measurements do not indicate whether the abilities are inherited or acquired. The results of tests of special ability given to large numbers of persons show that the traits or processes measured are always distributed among the population at large somewhat in accordance with the normal curve. In other words, median amount of an ability is possessed by the majority of persons, and the greater the deviation of ability from this median, the fewer the persons possessing that amount. Thus, in each trait some persons have marked ability while others have disability, and all persons have their strong points and their weak ones. It should therefore be remembered in discussing specific abilities that we might equally well describe specific disabilities. Where some persons have a large amount of a trait, others may have very little.

Sensory capacities.—These relatively simple capacities may be described under two headings, namely, sensory acuity and sensory discrimination. Sensory *acuity* is mainly sensitivity of receptors. It is capacity to experience sensations as a result of very weak stimuli. It thus means keenness of vision, sharpness of hearing, and the like. The range of sensory acuity among different people is very great, extending from anesthesia or complete absence of sensitivity to an extreme degree of hyperesthesia. Acuity also varies with different senses. For example, some persons are very sensitive to temperature changes, others to light, others to movement, others to tastes or

[1] See G. M. Whipple, *Manual of Mental and Physical Tests* (Warwick & York, 1921), Part I, "Simple Processes"; Part II, "Complex Processes."

odors, and so on. Tests have been devised for the measurement of sensory acuity in most of the senses. These may be illustrated by the charts of the optometrist for vision, and the audiometer tests for hearing.

Sensory *discrimination* is ability to distinguish between two sensations that are nearly alike in quality or intensity. It is illustrated by ability to distinguish between tones of different pitch, grays of different shade, colors of different hue, lights of different intensity, and so forth. Individual differences in sensory discrimination are likewise great. For instance, in the discrimination of pitch in the middle range of the musical scale some persons can distinguish tones that differ by only one-third of a vibration per second, while others can scarcely distinguish tones differing by twenty to thirty vibrations per second. Similar but less marked differences are found in discrimination of other sensory qualities and also in discrimination of sensations of different intensity, such as tones of different loudness. Sensory discrimination and acuity are important fundamental capacities, and can be fairly accurately measured by means of tests.

Motor capacities.—The simplest motor capacity is probably *speed* of movement. This was one of the first capacities to be measured in psychological laboratories. Simple reactions are made in about one-tenth of a second, but the time differs somewhat with different subjects. It was at first supposed that rate or *tempo* of movement was an original trait, but recent investigations suggest that even speed of reaction may be dependent very largely upon environmental conditions.[2] People living in a rushing industrial center have on the whole quicker reaction time

[2] Otto Klineberg, "An Experimental Study of Speed and Other Factors in Racial Differences," *Archives of Psychology*, 93 (1928).

than people living in slowly moving rural communities. We must therefore be less certain of the origin of even this simple trait. *Strength* and *endurance* are also motor capacities which have been extensively studied and can easily be measured.

Accuracy or precision of movement is another motor capacity which is very largely determined by experience and training. It is a form of skill and is dependent upon motor coördination. Motor skills are developed by training in specific performances. Some recent studies show that there is no general ability for motor coördination. Subjects were tested for skill in various kinds of activities, and it was found that there was little or no correlation among the different skills tested.[3] In other words, a subject might be exceedingly good in one form of motor coordination and poor in another. Each skill is thus acquired independently and separately as a result of experience in a particular activity. Skills are extremely important acquisitions. They are manifested in all human activities, in work, in play, and in social relations.

Memory and ideation.—Memory has already been discussed in some detail. It was pointed out that memory is not a general function or ability. It depends upon perception and learning, conservation, reproduction, and recognition. Subjects may vary in each of these functions. They vary in ability to learn, in capacity to retain, and in ability to recall what has been learned and retained. Memory is also made up of special memories for specific things, as memory for scenes, memory for words, memory for digits, memory for music, memory for meanings, and so on. Statistical studies have shown some corre-

[3] R. H. Seashore, "Stanford Motor Skills Unit," *Psychological Monographs*, 39 (1928), 51-66.

lation among these different memories, but, nevertheless, a person may be much better in one form of memory than in another.

Other ideational abilities closely allied to memory are imagination, judgment and reasoning. It has been pointed out how markedly individuals differ in imagination. They differ in the quality of imagination as well as in its extent or development, and in its relation to reality. People also differ in judgment and reasoning, and persons of good judgment are especially in demand. Judgment is no doubt a specific ability developed in relation to particular fields of interest and study. In other words, a person may have good judgment in one field and poor judgment in another, depending upon his experience, knowledge and training, as well as upon his personal interests and prejudices pertaining to the field in question. For instance, a person showing excellent judgment in his own science may have very poor judgment in other sciences or in business and social relations. There are excellent physicists who are extraordinarily gullible in the field of psychology, especially on the subjects of telepathy and spiritualism.

Artistic ability.—This is a still more complex ability, which may be developed in various fields, such as music, painting, sculpture, or literature. It may furthermore be manifested as artistic appreciation, as artistic creativeness, or as artistic skill. Some of these artistic abilities have been studied and analyzed. Professor C. E. Seashore has written a book on *The Psychology of Musical Talent.*[4] Some idea of the complexity of this ability may be obtained from the list of factors which he has attempted to isolate and measure. These are as follows: pitch discrimi-

[4] Silver, Burdett & Co., 1919.

nation, intensity discrimination, sense of time, sense of consonance, acuity of hearing, auditory imagery, musical memory, motility, timed action, rhythmic action, singing key, singing interval, voice control, register of voice, and quality of voice. Musical talent thus includes factors necessary for the appreciation of music, as well as factors such as motility, dexterity and voice control, which are involved in playing a musical instrument and in singing.

A similar analysis might be made of other forms of artistic talent. Some work has been done on the analysis and measurement of ability to draw and paint, but little has yet been accomplished. Some of the tests devised for artistic ability may be of considerable practical importance. It must be remembered, however, that artistic ability is extremely complex, and depends upon acquired as well as original factors. It is thus difficult to predict from measurements of a child whether he can develop artistic ability. The tests do not measure potentialities. They measure only actual abilities, which in combination may constitute or may result in artistic talent.

Linguistic ability.—This is also a complex ability. Its development begins with the learning of one's native language, which was described in a previous chapter. It includes ability to speak, write, spell, punctuate, paragraph, and achieve literary style in any language, native or foreign, modern or ancient. People vary considerably in language ability, but a great deal of this variation is no doubt due to variation in interest. Many persons who cannot learn a foreign language are really not interested in doing so, and they may even have an emotional prejudice against learning the language in question. English-speaking people have the reputation of being poor linguists; but their lack of ability is probably due to lack of interest

in foreign languages as well as lack of necessity for learning them.

Mathematical ability.—Some scientific analysis has been made of mathematical ability. It has been studied in "mathematical wizards" who perform wonderful mathematical feats. It has also been studied in certain *"idiots savants"* who have shown some ability in mathematics. The results of such studies merely indicate the complexity of the problem. Different mathematical minds work in different ways. Good visual imagination is usually required. Some persons who perform remarkable feats in rapid addition are able to visualize columns of figures in the imagination after actually seeing them for only a few seconds. This requires considerable power of concentration of attention. The abilities involved also differ for different branches of mathematics. In other words, mathematical ability is no doubt a group of special abilities rather than a single general ability. Algebra obviously requires capacities different from those required in geometry. Ability in pure science is allied to mathematical ability, while ability in applied science involves quite different traits. The latter implies a greater interest in the external world and in various practical problems.

Mechanical ability.—It has been found that children who are poor in scholastic aptitude may sometimes possess good mechanical ability. These children may be chronic failures in school. They repeat grades and are often definite problems to the teachers. But when they are transferred to a technical school or to a mechanical industry they may do remarkably well. It is not certain in such cases whether the failure to progress in school is due to lack of interest or to lack of ability. It may be that an unconscious attitude of antipathy to school work was

developed at an early age, while interest in mechanical things was not thus inhibited. Mechanical ability has considerable practical value, and various tests have been devised for its measurement. Some of these measure knowledge of mechanical appliances and principles, others measure ability to carry out mechanical performances. Such tests may be found useful in the study of children, particularly those who are not progressing satisfactorily in school.

Clerical ability.—A number of studies have been made of stenography, typing, and other forms of clerical work. The attempt was made to analyze these occupations into the simpler processes involved, and to devise tests for these simpler factors. Some of the processes involved are: use of language, immediate memory, speed of reaction, skill, and general information. The processes vary considerably with different kinds of clerical and office work. Some tasks involve memory for words and sentences, while others require memory for numbers. Some involve very highly developed forms of skill, while others require only simple motor coördination. All of them are extremely complex abilities dependent mainly upon experience and practice.

Abilities in other occupations.—Some study has also been made of abilities involved in the various trades such as carpentry, masonry, plumbing, and the like. A number of "trade tests" have been devised for the measurement of these abilities.[5] Some trade tests are *verbal* tests, while others are *performance* tests. They aim to differentiate between the "expert," the "journeyman" and the "apprentice" in a trade. They are of considerable value to

[5] J. C. Chapman, *Trade Tests* (Holt, 1921).

employers of tradesmen who wish to get a rating of the worker's ability before he is employed.

The only professional ability that has been seriously studied is teaching ability. This ability has been analyzed into its various components, and tests or "rating scales" have been devised for measuring it. It is thus possible to get a fairly accurate rating of the relative ability of the various teachers in a school system. Professional abilities are extremely complex, depending upon all the important aspects of the personality. They obviously depend upon knowledge, skill, and interest in the work; and in certain professions such as medicine, law and teaching, they likewise involve social qualities and abilities.

Social ability.—This is the ability to adjust to social situations and to get along with people. It is probably the most complex and important of all abilities. Social disability usually means failure, regardless of the excellence of other abilities possessed. Social ability involves knowledge, skill, and emotional adjustment. It includes knowledge of the social customs and traditions of various social groups as well as information on human nature in general. It also includes ability to do the correct or desirable thing on various social occasions. This may be called "social skill." It likewise requires emotional adjustment leading to tolerance if not appreciation of the feelings and views of other persons, and to the removal of personal prejudices and antagonisms. It involves, moreover, the ability to control affective responses and thus conceal irritation, annoyance, and dislike.

Social ability furthermore involves what may be called "social sense." This is ability to sense or intuit the feelings and desires of other persons, and to treat different people in different ways, regardless of one's own feelings or

opinions. A socially competent person treats people as they like to be treated and not as he thinks they should be treated. Social competence may be developed, by training and practice. Recently an attempt has been made to devise a scale for measuring this ability. The authors call it "A Social Intelligence Test." [6] "Intelligence" in this title is obviously not used in the sense of an innate capacity.

Practical considerations.—It is important for mental health that abilities and disabilities should be recognized. Parents and teachers should take them into consideration in the education of children, and employers whether of laborers or of professional workers should recognize them in their employees. Parents frequently have ambitions for their children along lines that they are quite unfitted to follow. These parents are trying to capitalize on their children's liabilities rather than on their assets. A child may be a failure at school, or later in college, because he is working in a field in which he has no interest or ability. He might have achieved success in some other line of work. Children sometimes become delinquent as a protest against uninteresting and difficult work, and adults often develop psychoneuroses for a similar reason. They are unable to achieve success and "a place in the sun" in work not suitable to their abilities or interests.

Tests for these various abilities have considerable value in the selection of employees. If an employer knows what particular abilities are required in a task, he can make profitable use of tests in selecting employees who have such abilities. It is important to note in this connection that the tests in themselves do not indicate what skills

[6] Thelma Hunt, "The Measurement of Social Intelligence," *Journal of Applied Psychology*, 12 (1928), 317-334.

or abilities an employee will acquire; they merely rate or measure his abilities as they are. But employers are chiefly interested in what a person actually can do. Moreover, abilities already possessed may be a rough indication of abilities that will be acquired, on the theory that if a person has developed in the past along some special line he is likely to continue developing in the same way.

The tests have less value in the vocational guidance of children, because here it is desired to know what abilities the child will acquire rather than what he now possesses. They have, however, some usefulness in this connection. As previously mentioned, ability already acquired may indicate the nature of future development. Moreover, complex abilities in various occupations may be analyzed into simpler abilities or functions as described above. These simpler functions may be found in a child and thus indicate the possibility of development of the more complex ability. It is, however, more important in vocational guidance to ascertain the interests of the subject in various occupations and his incentives for achievement. These are of greater significance for success than the abilities measured by tests.

CHAPTER XXVI

TEMPERAMENT AND CHARACTER

There is at the present time no entirely satisfactory definition of temperament, and no generally accepted analysis of its constituent factors. The same is true of character, which has not been clearly distinguished from temperament nor from personality. It is therefore desirable to attempt to differentiate temperament and character, and to distinguish them both from the more complex total personality. Temperament and character are analogous to and coördinate with intellect. Intellect refers to the cognitive aspect of personality, while temperament refers to the affective aspect, and character to the conative aspect. In more popular language, intellect pertains to thinking, temperament to feeling, and character to doing. Intellect was described in Chapter XXIV. Here it is proposed to describe temperament and character.

TEMPERAMENT

Theories and analysis of temperament.—The oldest existing classification of temperaments is that of the Greek physician, Galen. His classification was based on the ancient theory of *four bodily fluids or humors*. The predominance of any one of these humors was supposed to result in a particular kind of temperament. The four temperaments thus determined were, choleric, sanguine, melancholic, and phlegmatic. These terms are now es-

tablished in popular language, and their meanings are well-known.

Wundt held that temperament was a matter of *strength and speed of reaction,* and he made an analysis of the four traditional temperaments from this point of view. His analysis may be summed up as follows:

	Strong	Weak
Quick	*Choleric*	*Sanguine*
Slow	*Melancholic*	*Phlegmatic*

The reactions of a choleric person are thus strong and quick; of a melancholic person, strong and slow; of a sanguine person, weak and quick; and of a phlegmatic person, weak and slow. This analysis helps in the understanding of the four traditional types, but it seems arbitrary to limit temperament to the speed and strength of reaction. These are merely special aspects of temperament or of character.

Temperament is *based upon feelings and emotions.* These may be regarded as the elements which are modified, combined, and organized in various ways in the development of temperament. Every temperament has, as a rule, a definite feeling tone, either pleasant or unpleasant. Sanguine and optimistic temperaments are pleasant, while melancholic and despondent temperaments are unpleasant. A choleric temperament may be either pleasant or unpleasant depending upon various circumstances. Perhaps only the phlegmatic temperament is quite indifferent or almost without feeling. There are, of course, other temperaments in addition to the traditional four. Some of them are the *timid, amorous, tender* or affectionate, and *unstable* temperaments. These also have their characteristic pleasant or unpleasant feeling tones.

The relation of temperament to emotion is perhaps the most obvious aspect of the subject. There appears to be a temperament based upon the predominance of each of the more important emotions. Thus, fear predominates in the timid temperament, anger in the choleric, elation in the sanguine, subjection in the melancholic, the sex emotion in the amorous, and the parental emotion in the tender or affectionate temperament. A general deficiency of emotion characterizes the phlegmatic temperament, while variability of emotion results in an unstable temperament. Persons therefore differ in temperament because they differ in the intensity and organization of their emotions, and in their dominant emotion. A temperament is due to predominance of some one emotional tendency, or to greater susceptibility to some one particular type of emotional response. If two or more emotions are about equal in strength, the resulting temperament may be in the nature of a compromise or combination; or it may be characterized by an alternation of moods.

An *endocrinological theory* of temperament has recently been advanced. It may be regarded as a modern form of the "four-humor doctrine" of the ancients. This theory ascribes temperament to the influence of autacoids (hormones and chalones) thrown into the blood stream by ductless glands. The type of temperament depends upon the dominating gland, and domination is a matter of relative hypersecretion. We have thus a temperament for each endocrine gland instead of for each emotion as above. For example, the *thyroid temperament* is the restless, excitable, nervous type; while the *adrenal temperament* is the virile, sanguine or choleric type. Pituitary and gonadal types have also been described. Anything which temporarily upsets the normal endocrine balance will lead

to moods or temporary aberrations of temperament. This theory arose from the work of Cannon and Crile on internal secretions and emotions, and has been systematically worked out in a speculative treatise by Berman.[1] It is not incompatible with the relation of temperament to emotion. It merely carries the analysis a step further. The dominance of an emotion may be based upon the relative dominance of some endocrine gland.

The relation of temperament to other *autonomic functions* has also been suggested. The autonomic nervous system consists of two antagonistically related parts: (1) the sympathetic system, and (2) the parasympathetic, that is, the cranial and sacral divisions of the autonomic system. Two corresponding temperaments have been described, namely, sympathicotonic and vagotonic. The former is due to hyperactivity of the sympathetic, and the latter to hyperactivity of the parasympathetic system, particularly of the vagus nerve. The *sympathicotonic* is an anxious, restless, hyperactive temperament, especially susceptible to fear and anger; while the *vagotonic* is a slow, depressed, and perhaps affectionate or amorous temperament.

Kempf has pointed out that the normal balance of the two parts of the autonomic system may be disturbed in relation to any viscus or segment.[2] This results in what he calls a "segmental craving" which is a feeling of tension or restlessness in a particular viscus. Such autonomic disturbances react upon the central nervous system, causing it to continually readjust its receptors until stimuli

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[1] Louis Berman, *The Glands Regulating Personality* (Macmillan, 1921).

[2] E. J. Kempf, *The Autonomic Functions and the Personality*, Nervous and Mental Disease Monograph, No. 28 (1918).

are found which allay the distress. The liability to particular segmental tensions varies according to Kempf from subject to subject, and may be the basis of differences in temperament. Temperament is thus determined by the unbalanced or most easily unbalanced segment or viscus. Segmental tensions may play a rôle in the physiology of emotion and hence of temperament. An emotion may be in part a matter of the tonus of an autonomic segment, just as it may be in part a matter of relative hypersecretion.

Davenport has studied the *inheritance of temperament*.[3] His genetic studies have led him to the hypothesis that temperament is determined by two germinal factors: (1) a factor for *excitement, E,* and its absence, *e;* and (2) a factor for *cheerfulness, C,* and its absence, *c*. These factors behave as if in different chromosomes so that they are inherited independently of each other, and may occur in any combination. Nine different zygotic combinations are thus possible; and since dominance is imperfect, two doses of a factor giving a more pronounced result than one, nine different types of temperament may arise. This analysis of temperament into two fundamental factors, excitement and cheerfulness, is of considerable psychological interest but needs verification. Moreover, the inheritance of temperament remains questionable. If temperament means "total affective make-up," it is obviously as much dependent upon environmental influences as upon heredity.

It seems desirable to regard temperament as analogous to intellect. Just as the latter means total cognitive

[3] C. B. Davenport, "The Feebly Inhibited: Nomadism, Inheritance of Temperament," Carnegie Institution of Washington Publications, No. 236 (1915).

make-up, so the former means *total affective make-up.* Temperament thus includes affective intelligence, affective elements, and affective organization. *Affective intelligence* is the capacity to condition, modify and combine feelings and emotions. It is an important condition of affective development. The *affective elements* are the simple feelings and emotions. *Affective organization* is a matter of association and integration of these elements. It may begin with simple feelings and emotions which are modified, conditioned, and organized into compound emotions, affective attitudes, and the affective aspects of sentiments, interests, and aversions. These complex affective factors may be further organized into major affective attitudes, such as occur in loyalty or in the dominant sentiment. The simpler affective factors become subordinated to the more complex. Physically, affective organization is probably the organization of autonomic functions, very likely through subcortical connections.

Needless to say, perfect affective organization is even rarer than complete cognitive organization. The affective life is usually piecemeal, relatively undeveloped, and therefore unstable. Organization increases stability. The degree of development of temperament depends upon the degree of affective intelligence, upon the nature and strength of the feelings and emotions, and upon environmental influences, especially guidance and training along affective lines. This aspect of personality is usually neglected in modern education which emphasizes only the development of intellect and skill. The ancient Greeks provided in some measure for affective development in their training in art and music.

Mood.—Mood is the same as temperament except that it has a shorter duration. Temperament may be regarded

as a relatively permanent mood. Moods therefore exist in the same variety as temperaments, and are probably determined by similar causes. A moody person is one whose temperament is variable. Such a person is sometimes called "temperamental." The variations are often determined by physical factors, for instance, digestive disorders, endocrinal disturbances, other forms of illness, or the weather. They may also be determined by mental factors. An anxious mood may be due to mental conflict. A depressed mood may result from a blow to one's pride or ambition, just as a sanguine mood may result from a "boost to the ego." The more highly organized and developed a person's temperament becomes, the less moody and variable he will be. Children are generally variable, while adults usually achieve some degree of stability.

Abnormalities of temperament.—Since temperament includes all affective processes, it will be abnormal if its elements or their organization are abnormal. All the abnormalities of feeling and emotion previously described have, therefore, effects upon temperament. Moreover, abnormal variations may occur in the affective learning capacity, just as they occur in the cognitive and conative learning capacities. A deficient affective intelligence implies a poor ability to modify and combine feelings and emotions. Temperament may, as a consequence, remain undeveloped. The person concerned is *affectively inadequate,* that is, childishly emotional. On the other hand, superiority in affective intelligence may result in a high degree of temperamental development. The person concerned is *affectively competent,* or emotionally well adjusted.

Temperamental organization depends upon environmental influence and guidance as well as upon affective

intelligence. Variations in organization are therefore in part due to these environmental factors, just as variations in intellectual organization are due to similar factors. *Poor affective organization* may thus be a result of inadequate guidance and direction along affective lines, or of low affective intelligence. Poor organization means variability and instability in the affective life. Moreover, it may result in eccentric, antisocial or criminal behavior even in persons who are well developed intellectually. It may account in part for "joy riders," "thrill-killers," and other such anomalies frequently described in the daily press.

The following abnormal temperaments or moods may be regarded as exaggerations of certain normal types. *Euphoria* is an exaggeration of the sanguine or optimistic mood or temperament. It may be passive or active in form. Passive euphoria is characterized by marked feelings of pleasantness and quiescence and by extreme exaltation and self-confidence. In active euphoria, quiescence is replaced by excitement. Euphoria occurs in a typical form in the manic phase of manic-depressive insanity and in mild alcoholic intoxication. It is also manifested in the joyous and hilarious moments experienced by ordinary persons.

An opposite abnormality is *depression* or morbid sadness. This may be regarded as an exaggeration of the melancholic temperament. It is characterized by unpleasantness, subjection, and sometimes by fear. This temperament occurs in the depressed phase of manic-depressive insanity, as well as in the lethargic periods and "blue days" of persons who are not mentally diseased. There may be alternation between euphoric and depressed moods. This is particularly characteristic of manic-depres-

sive insanity. It is called *cyclothymia* [4] or the cyclothymic temperament. Cyclothymia is a common phenomenon in mental health. Many persons exhibit marked variations from exalted to gloomy moods.

There is also an abnormal temperament which may be regarded as an exaggeration of the choleric temperament. Its special features are anger, excitement, and unpleasant feeling, and it may be called morbid irritability or *irascibility*. It occurs as a mood in some forms of physical illness such as digestive disturbances, and it is also found as a more permanent temperament in certain kinds of mental disease. *Morbid indifference* or excessive tranquillity may be regarded as an exaggeration of the phlegmatic temperament. It sometimes occurs in dementia præcox and occasionally in the psychoneuroses.

Another interesting temperamental abnormality is found in fanatics. The *fanatical temperament* is marked by exaggeration of some special feelings and emotions, as for example, those pertaining to politics, religion, or sex. These feelings and emotions completely dominate thought and action and render the subject incapable of unbiased judgment. A somewhat similar temperament occurs in epileptic patients. But the *epileptic temperament* is more particularly characterized by periodic ill-humor and grouchiness. The epileptic is, moreover, likely to be egotistical, obstinate, and fanatical. A temperament of this type also occurs in less obvious form in some persons who are not epileptic.

One of the most common temperamental aberrations is the *unstable temperament*. Its fundamental characteristic

[4] S. E. Jelliffe, *Cyclothymia—the Mild Forms of Manic-Depressive Psychoses and the Manic-Depressive Constitution*, Nervous and Mental Disease Monographs, No. 9 (1912), 193-208.

is superficiality and variability in the affective life. Feelings and emotions are easily aroused but very readily disappear. Hence the subject passes rapidly from one feeling or emotion to another. This temperament is found in hysteria and is consequently sometimes called the "hysterical temperament." Instability is also an affective trait of children, who easily change from one emotion to another. The trait may therefore be called "emotional infantilism." [5] It disappears with the organization of the affective life consequent upon growth and experience. An unstable adult has thus the emotional characteristics of a child. Adult instability may result from poor affective intelligence or lack of opportunity for development.

CHARACTER

Analysis of character.—Character has the same *relation to impulse and action* as temperament has to feeling and emotion. Subjectively, character pertains to impulses and their organization, while objectively it pertains to movements and their coördination. Character must be considered from both points of view, just as instinct and habit are so considered. Character is obviously related to the *instincts,* that is, to the universal drives and modes of behavior. In fact, there are types of character based upon predominance of different instincts, just as types of temperament are based upon predominance of different emotions. For example, the pugnacious character is based upon the fighting instinct, the "safety-seeking" character upon the instinct of escape, the dominating and submissive characters upon self-assertion and self-abasement, the miserly character upon the instinct of

[5] Théodule Ribot, *Psychology of the Emotions.*

acquisition, the helpful character upon the parental instinct, and so forth. Some types of character may be based upon two or more dominant instincts. Thus, aggressiveness is probably a matter of self-assertion and pugnacity.

Sometimes a trait of character is an *overcompensation* for or a defense against a strong instinctive drive or emotion of the opposite nature. For instance, a domineering trait may be a defense against submissiveness, prudishness may be a defense against the sex drive, rashness may be a defense against fear, gentleness against pugnacity, and so on. It would seem, therefore, that the dominant instinct may result in either a similar character or an opposing one, depending perhaps on the nature of early training. In the former case, the character is truly instinctive, in the latter it is a matter of individual habits—instincts are concealed by compensating habits.

It follows that the same trait of character may sometimes be given two interpretations. It may be due to a dominating instinct or to compensation for an opposite instinct. A domineering character may be based directly upon self-assertion, or may be a compensation for self-abasement. Likewise, courage may be based upon social instincts and self-assertion, or it may be a reaction against fear. An instinctive character may be distinguished from a compensating character by the fact that the latter usually goes to extremes. A courage that compensates for fear is usually rashness, and a domination that compensates for submissiveness is usually arrogance. A compensating character trait is never a golden mean. Its very existence depends upon complete denial of the opposite impulse.

The relation of character to *individual habits* is even more important than its relation to the universal drives.

The compensating habits mentioned above are of an individual nature differing markedly from subject to subject. All habits are included in the general conception of character. Habits of skill and habits of work and play are included as well as personal and social habits. Social habits are usually regarded as of major importance. These are such habits as obedience, truthfulness, honesty, punctuality, helpfulness, and thriftiness. All these habits are of a specific nature, that is, they must be acquired independently for each situation. *Character traits are not general.* Recent investigations have shown that a person may be honest in certain situations and dishonest in others.[6] Similarly, a person may be punctual in certain things and tardy in others, extravagant in some things and thrifty in others, law-abiding in certain situations and lawless in others, and so on. It follows that in the training of character the desired habits must be practiced in as many situations as possible.

Habits of control are of special importance in character. Roback has defined character as "an enduring psychophysical disposition to inhibit instinctive impulses in accordance with a regulative principle." [7] He believes that this power of inhibition is an innate ability. Some forms of neural inhibition may be innate; but the sort of inhibition involved in character is more likely a matter of habit, the habit of control. There is considerable evidence for this in genetic psychology. It is found that habits of control are slowly acquired by children. Moreover, they are acquired separately for each specific impulse and situ-

[6] Hugh Hartshorne and M. A. May, *Studies in Deceit* (Macmillan, 1928).

[7] A. A. Roback, *The Psychology of Character, with a Survey of Temperament* (Harcourt, Brace, 1927).

ation. A person may thus have good habits of control for certain impulses and not for others. He may also have control in one situation and not in another, depending upon his training and experience. For instance, a person may have learned to control the impulse to take what does not belong to him in his business relations, and at the same time he may not have learned to control it in other social relations. Many otherwise honest people have no compunctions about stealing books, umbrellas, or alcoholic beverages.

Character may thus be defined as *total conative make-up*. It includes conative intelligence, impulses, and their organization. *Conative intelligence* is the capacity to condition reflexes and instincts, and to modify and coordinate impulses or movements into more and more complex drives or habits. The *impulses* involved are both instinctive and habitual, that is, universal and individual. All kinds of habits are included, but habits of control are of major importance. The *conative organization* may begin subjectively with simple impulses which are conditioned, modified, and integrated into more and more complex drives. These drives are further organized into a major drive, such as occurs in a dominant purpose. Objectively, the skeletal responses are modified and coordinated into habits, and these habits are further coördinated into more and more general motor attitudes. A perfect organization of character is, of course, as rare as complete organization in intellect or temperament. As a rule, many impulses remain outside the organization and consequently outside conscious control, for organization implies control.

Will.—The term "will" has a wide range of meaning in popular language, in traditional psychology, and in

philosophy. It is not often found in modern psychology because of its philosophical and theological implications. It may, however, be used to signify the *organization* and *direction* of impulses. It thus implies an idea of the end or goal of action, and is therefore analogous to purpose. In purpose, however, the emphasis is on the idea, while in will it is on the direction of impulses. Will may involve active volition which is characterized by the feeling of effort. This is the case when there are some conflicting impulses in the organization. But will as here defined is also applicable to the effortless direction of impulses in a more perfect organization. Will is therefore an aspect of character, but the latter is more inclusive as indicated in the description above.

Abnormalities of character.—Since character depends upon many factors, it will be abnormal if any of these factors are abnormal. One of the factors is conative intelligence, which varies in the same way as other kinds of intelligence. Some subjects lack the capacity to modify and coördinate impulses or movements. They have deficient conative or motor learning capacity, and are the *motor defectives,* the unskilled and awkward. Other persons are very superior in this ability. They easily acquire skills, social behavior, or habits of control. They are the conative or *motor geniuses,* the skilled and poised.

Abnormalities of instinct and habit also produce abnormalities of character. Deficient or excessive habits of control are of special importance. Abnormalities in all these components of character were described in chapters IX and XII, and need not be repeated here. The organization of character may likewise be defective. This may be due to deficiency in conative learning capacity, or to lack of guidance and training in the development of motor

functions, social behavior and other aspects of character.

The strength or weakness of character depends chiefly upon the organization and control of impulses. In a *strong character* the impulses are organized into a system or hierarchy in which the single tendencies are subordinated to a main drive. Such a character implies a well-developed dominant sentiment. But it may conform to, or differ from, accepted standards of morality. A strong character is not necessarily identical with a conventionally moral character. A person may also be abnormal in the intensity of his effective drive. This is partly due to intensity of impulses and partly to perfection of organization which enables him to utilize all the energy he possesses.

In a *weak character* there is absence of, or defective, organization. The various impulses may conflict with, or be antagonistic to, each other. The subject is consequently driven in opposed directions and the internal conflict prevents effective response. Such a defective organization of impulses may account for anomalies of behavior in persons of good intellectual ability. A weak character, since it involves internal conflict, is characteristic of the psychoneuroses. Sometimes the conflicting impulses reach an *impasse* preventing effective response. This has been called *aboulia* or blocking of the will. Another form of weak character is due to deficiency in the strength of impulses rather than to their defective organization.

The *unconventional* or the *criminal character* may be strong or weak. If such a character is strong, the abnormality lies in the fact that the impulses are organized in connection with an unusual or an antisocial sentiment or purpose. If such a character is weak, the unconventional behavior is merely the outcome of poorly directed impulses or misguided and perhaps conflicting motives.

CHAPTER XXVII

PERSONALITY

The term "personality" is used in popular language in many different senses. Sometimes it is used in the sense of personal attractiveness or "sex appeal." Again it connotes some mysterious power of personal magnetism; and occasionally it is used with reference to affective or intellectual characteristics. Even among psychologists there is little agreement regarding the meaning of the term. It is often used to cover only special traits of character and temperament; but it is also used in a broader sense to include all mental and physical characteristics. The view presented here is an attempt to bring together and make systematic the partial accounts of both introspectionists and behaviorists.

The chief propositions here advanced are summed up briefly in the following statements: (1) Personality is a psychophysiological concept, that is, it has both mental and physical aspects. (2) Personality is the *sum-total* and *organization* of mental and physical traits and processes, some of which are original and some acquired. (3) Personality has three closely interrelated parts: cognitive, affective, and conative. (4) Each of these parts undergoes a fundamentally similar type of organization and development, which is dependent upon: (*a*) the existence of elements, (*b*) intelligence or learning capacity, and (*c*) environmental influences, experience, guidance, and train-

ing. (5) The cognitive organization may be called intellect; the affective, temperament; and the conative or motor, character. (6) These three organizations are more or less closely interrelated throughout all the levels of development. (7) Personality varies with reference to its components, its integration and organization, the relative dominance of its parts, and its mode of expression. (8) Abnormalities of personality are extreme variations in any of these respects. (9) Any mental or physical disorder is in a sense a disorder of personality, but some disorders affect the total personality more than others.

Personality a psychophysiological concept.—Personality has a physical as well as a mental aspect. Physical personality will not be considered in detail here. Anthropometrists have described various physical features and characteristics, and have shown that they vary markedly from person to person. Some of these characteristics may be accurately measured by anthropometric methods. A few of them are: cephalic index, size of head, size and shape of nose, mouth, or other physiognomical features, size and shape of hand, and so on. "Character readers" believe that these features signify or imply certain mental traits of personality. An exact correlation between physical and mental traits has, however, never been scientifically established. There are also less definite qualitative physical characteristics, such as beauty, striking appearance, and the like. These are popularly but erroneously often identified with personality.

Human beings may be more or less roughly classified into physical types, as male and female, young and old, blond and brunet. Kretschmer has recently described four physical types of persons: namely, asthenic, athletic,

pyknic, and dysplastic types.[1] These were determined by observation and measurement of patients in a hospital for the insane. The *asthenics* are the skinny, lanky persons who are relatively tall in comparison with their weight. The *athletics* are heavily built, muscular, and well developed with good bodily proportions. The *pyknics* are stout, thick-set, and relatively short for their weight. The *dysplastics* are other persons not classifiable into the first three types. The asthenics and the pyknics may be popularly described as the human "bean poles" and "beer kegs." Kretschmer found a predominance of asthenics and athletics among his dementia præcox patients, and a predominance of pyknics among his manic-depressive patients. He suggests that mentally healthy persons may also be classified into these types, and may exhibit the corresponding mental characteristics in a lesser degree.

People have also been classified into macro-splanchnics, micro-splanchnics and normo-splanchnics.[2] The *macro-splanchnics* correspond more or less closely to Kretschmer's pyknics, the *micro-splanchnics* to the asthenics, and the *normo-splanchnics* to the athletics.

The mental aspect of personality is more important than the physical, but the mental aspect has its physical correlate. In accordance with the double-aspect theory of mind-body relation, mental personality and the nervous system are subjective and objective aspects of the same thing. Personality is thus not twofold in its ultimate nature. A philosophical monism replaces the less satisfactory dualism which is still occasionally found in modern psychology as interactionism and certain forms of psycho-

[1] Ernst Kretschmer, *Physique and Character* (Kegan Paul, 1925).

[2] Sante Naccarati and H. E. Garrett, "The Relation of Morphology to Temperament," *Journal of Abnormal Psychology*, 19 (1924), 254-263.

physical parallelism. Personality may be viewed by the subject introspectively as consciousness, and it may be studied by the objective observer as neural activity and bodily responses. Any complete account of personality should describe it from both standpoints, but some parts of it are more easily described from the one than the other. The accounts given of the two aspects are therefore not equally complete.

Components of personality.—Personality has three parts or divisions: cognitive, affective, and conative. These three parts can be treated separately only for purposes of analysis and exposition. In reality they are closely interrelated in any well unified personality, less closely in a poorly organized personality, and still less in a dissociated or abnormal one. The cognitive and affective divisions are better known subjectively, and accounts of them are more easily written in terms of consciousness. The conative part is better known objectively and may be more easily described in terms of behavior. Its conscious aspect consists of impulses and their organization.

Some components of personality are original, and some are acquired. The original components or elements of *cognition* are mainly sensations. More complex, derived components are perception, memory, judgment, reasoning, and the like. The controversy as to which or what part of the cognitive functions are original and which derived has no bearing upon the view of personality here outlined. It is enough to assume that some components are original and some acquired. These cognitive factors probably have as their physical counterpart chiefly sense organ capacities and cortical functions.

The components of the *affective part* of the personality are the simple elements of pleasantness and unpleas-

antness, and the more complex factors, emotions, moods, and affective attitudes. These affective factors probably have as their physical counterpart chiefly activity of the autonomic apparatus, that is, of the glands, the smooth muscles, and the autonomic or vegetative nervous system and its central connections.

The components of the *conative part* of the personality are more easily indicated on the physical side. They are reflex actions, random movements, instinctive responses, habits of skill, social habits, and so forth. From the standpoint of consciousness the basic element is *impulse* (urge or drive). There are simple impulses as the conscious counterpart of reflex action and random movement. There are complex impulses as in instinct and habit. There are original impulses as in reflex action and some instincts, and acquired (coördinated or conditioned) impulses as in universal and individual habits.

Another important component of personality occurring in all three divisions is *intelligence* or capacity to learn, which on analysis is probably reducible to capacity to form and change associative bonds. This learning capacity as previously pointed out is probably not altogether a single general factor. There seem to be different learning capacities for different things, and some of these capacities are more highly correlated than others. More or less closely related learning capacities are grouped together into minor and major groups which may be regarded as different kinds of intelligence. Three of these major groups constitute the three chief kinds of intelligence; namely, cognitive intelligence, affective intelligence, and conative or motor intelligence.

Organization of personality.—An organization is a combination of elements into a working unit. Thus, a ma-

chine is an organization of mechanical parts. Similarly, organization of personality means *integration and unification of parts*. It implies formation of associative bonds among elements and arrangement of the various components into a hierarchy of more and more complex systems. Organization of personality depends upon: (1) the existence of original elements, (2) intelligence or learning capacity, and (3) environmental influences: education, guidance, and training. Organization takes place in each part of the personality and results in intellect, temperament, and character, which have already been described.

The type of organization in the three parts of the personality is fundamentally similar. There are, in the first place, certain relatively simple but observable components: perceptions and ideas, feelings and emotions, reflexes and instincts. These components may, on the one hand, be further analyzed into more or less hypothetical elements; but, on the other hand, they become integrated into more complex groupings, such as knowledge, affective compounds, and coördinated impulses or motor habits. These groups or systems are then further associated, integrated, or coördinated into still more complex and more highly organized systems; namely, scientific world view, affective aspect of the dominant sentiment, and major drive or more complete coördination of habits (general motor attitude).

The three organizations into intellect, temperament, and character do not, however, take place independently. Their relationship may be represented by the three sides of a triangular pyramid. In the ideal personality there would be not only complete organization of cognitive, affective, and conative elements, but also a close interrelation and interdependence of the three parts. This

interrelation is shown at every stage of development. Instinct, for example, rarely occurs without emotion and ideation; sentiment includes feelings, emotions, ideas and impulses; and purpose is likewise a unification of all three systems. If personality is represented diagrammatically by the three sides of a triangular pyramid, the major purpose would be at the apex as a resultant of organization of all the organizations; but in addition to the apex as the meeting point of the three part systems, there would need to be lines drawn through the body of the pyramid connecting points on each surface with points on the other two.

Individual differences in personality.—Personality as thus described varies greatly from individual to individual. These variations are due to: (*a*) differences in number and strength of the components; (*b*) differences in intelligence, cognitive, affective and conative; and (*c*) differences in environmental influences, including guidance and training. Some of the variations will now be mentioned. In the first place, there are individual differences in *complexity of personality*. This has reference to the number of components in intellect, temperament, and character. An individual may have much or little knowledge or information, few or many sentiments or interests, and few or many drives or technical and social skills. Under this caption are therefore included variations in: (*a*) breadth of knowledge, (*b*) diversity of interests, and (*c*) multiplicity of skills and variety of social behavior.

Secondly, there are marked variations in degree of *integration of the personality*. Few personalities attain complete unity. As a rule, many components are dissociated from the main organization; and sometimes groups of associated components (complexes) and even more complex organizations are similarly disconnected

and split off from the main personality. Such dissociation may be the sequel to a mental conflict. Mental conflict and dissociation may occur in the realm of cognition, affection, or conation; so that the dissociated parts may be ideas, affects, impulses, or combinations of all three (complexes).

Sometimes the cleavage is between the different divisions of the personality. For example, the cognitive organization may be partly or completely independent of the affective or conative. This implies a repressed, a "one-sided," or a "water-tight compartment" type of personality. In other cases, the dissociation or incoördination (intrapsychic ataxia) is between simpler components of these main divisions, as for instance, between particular ideas and feelings, ideas and actions, or feelings and actions.

When ideas are not associated and subsumed under some logical guiding principle, thinking is likely to be irrational, irrelevant, and perhaps incoherent. Similarly, when feelings and emotions, interests and aversions are not integrated and subordinated to some major sentiment, the affective life is more or less variable, unstable, and spasmodic. And, in like manner, when impulses are not coördinated into a major drive in which the partial impulses are subservient to the whole, the behavior will be unpredictable and uncontrolled. Moreover, when the three divisions are not intimately interrelated, the personality lacks unity and strength. The various degrees of integration in cognition, affection, conation, and total personality probably occur in children at different stages of their development. Organization is a slow process, but it is a measure of the *strength of the personality* as a whole or in any of its parts.

A third way in which individuals may vary is in what may be called *balance of personality*. A well-balanced personality is one in which intellect, temperament and character are equally well developed and organized. But there are individuals in whom the intellect is dominant, others in whom the affective side is more highly developed and dominant, and still others in whom the conative or motor organization is dominant. The first are the cold-blooded intellectualists and scientists; the second group have well-developed sentiments, artistic appreciation, and marked enthusiasm; while the third group are the energetic men of action. But knowledge, sentiment, and organized impulse are all equally important for a well-balanced personality. Another form of imbalance is dependent upon marked deviation (increase or decrease) in the strength of some minor component such as certain kinds of images, emotions, or impulses.

A fourth variation in personality is in the *mode of expression*. This is probably reducible to variation in complexity, integration, and balance. It is dependent upon the direction of attention (interest or libido), the nature of the dominating ideal and of the major sentiment, early environmental influences and training, heredity, and probably upon other unknown factors. In mode of expression the personality may be introverted or extraverted; egoistic or altruistic; conservative or radical; primitive, sublimated, or repressed; and if repressed it may yet express itself in defense reaction, projection or rationalization.

The distinction between introverts and extraverts was first made by Jung.[3] An *extravert* thinks, feels, and acts

[3] C. G. Jung, *Psychological Types* (Harcourt, Brace, 1923).

in relation to the object or situation. He is determined exclusively by the external world. His thinking refers to reality, his feeling is influenced by conventional standards, and his behavior pertains to practical situations. An extravert is thus a conventional man of affairs and a defender of things as they are, in short a "Babbitt." He is usually economically and politically successful and socially approved. His weakness is that he is too much influenced and determined by external factors and thus loses his individuality. He is an enemy to true social progress; and although interested in applied science, he is likely to scorn search for knowledge for its own sake. An extreme form of extraversion is found in hysteria and in manic-depressive insanity.

An *introvert* thinks, feels, and acts in relation to his own mental processes. His thinking is an elaboration of his own ideas and is determined chiefly from within. His feelings and actions are likewise subjectively determined, and therefore may not conform to conventional standards. The introvert is thus likely to be radical in thought, feeling, and action. He is an idealist and a dreamer; he believes in political and social reform, and may write books on the "ideal state." He is not necessarily egotistical or even selfish as is sometimes supposed. In fact, he may be extremely altruistic. The inward direction of interest is not necessarily a direction towards the ego, but rather towards the unhampered elaboration of mental processes. He is usually a friend of social progress, reform, and pure science, but he is likely to be impractical in carrying out his plans. His danger is that he may become too completely divorced from reality. His thought may merely reflect an ideal world and not the world in which we actually live. An extreme form of introversion or flight

from reality occurs in psychasthenia and in dementia præcox.

Kretschmer has made a distinction between schizoid and cycloid types of personality which is somewhat similar to but not identical with Jung's distinction between introverts and extraverts.[4] The *schizoid type* or the *schizothyme* possesses in minor degree the mental characteristics of a dementia præcox patient. This type is similar to the "shut-in personality" described by Hoch.[5] It shows a form of introversion in which there is flight from reality, preoccupation with the self, and a marked tendency towards dissociation of mental processes. The *cycloid type* or *cyclothyme* possesses in a minor degree the mental characteristics of a manic-depressive patient. This type shows a form of extraversion. The subject is in close contact with reality and his feelings are markedly affected by external situations. He alternates between exaltation and depression. Kretschmer has shown that there is a correlation between these types of personality and the physical types previously mentioned. He found that the cycloids are commonly pyknics and the schizoids are often asthenics.

Bleuler has described *syntonic* and *dercistic* types of personality.[6] The former are "tuned with" or adjusted to other persons and social institutions, while the latter are "away from reality" and absorbed in phantasy. Bleuler also recognizes the schizoid or dissociated type described above. It is clear that a person may be withdrawn from reality and yet achieve a high degree of integration. He

[4] Ernst Kretschmer, *op. cit.*

[5] August Hoch, *Constitutional Factors in the Dementia Præcox Group*, Nervous and Mental Disease Monographs, No. 9 (1912), 111-122.

[6] Eugen Bleuler, *Text-Book of Psychiatry*, translated by A. A. Brill (Macmillan, 1924).

may be an introverted or a dereistic type without being internally dissociated.

Rosanoff has recently presented a theory of personality based on psychiatric experience.[7] He classifies the abnormal types into: (*a*) the *antisocial,* hysterical, malingering, or criminal, (*b*) the *cyclothymic,* (*c*) the *autistic* or "shut-in," and (*d*) the *epileptic*. He believes these types are merely quantitative variations of normal types. Moreover, no hard and fast lines can be drawn between the types. Pure types are the exception, mixed types the rule in both normal and abnormal cases. All normal subjects have within them either manifest or latent antisocial, cyclothymic, autistic, and epileptic tendencies in various degrees. These tendencies may be observed especially in children; but they are normally inhibited to some extent and outgrown in the course of development to maturity. The power of inhibition is thus the most important differentium of the so-called normal.

These personality trends are, according to Rosanoff, inherited in accordance with definite Mendelian principles and in conformity to the following scale of dominance: normal, antisocial, cyclothymic, autistic, and epileptic. The scale progresses from epistatic to hypostatic traits, that is to say, the manifestation of each succeeding trait is concealed or inhibited by the preceding one. Rosanoff's views regarding types and the relation of the normal and abnormal are interesting and suggestive, but his genetic theory of personality is highly speculative and requires verification.

Other types of personality have been described, such as *intellectual, practical, artistic,* and *social* types. These

[7] A. J. Rosanoff, "A Theory of Personality Based Mainly on Psychiatric Experience," *Psychological Bulletin,* 17 (1920), 281-299.

depend chiefly upon the direction of interest along special lines. They may, however, have some basis in original aptitudes. William James made a distinction between "tough-minded" and "tender-minded" philosophers.[8] The *tough-minded* are the materialists or realists, while the *tender-minded* are the idealists. The former are usually determinists while the latter are likely to believe in free will. This distinction is somewhat similar to Jung's distinction described above. But the tough-minded and tender-minded cannot be altogether identified with the extraverts and introverts. A distinction has also been made between *classicists* and *romanticists*. The former emphasize form and appearance, while the latter emphasize content and meaning.

These various distinctions are interesting and may have some practical significance. It should be emphasized, however, that persons cannot really be classified easily into types. All the types described represent extreme deviations from the "central tendency." A normal person no doubt possesses characteristics of all the different types. For instance, a normal mind is neither completely introverted nor extraverted, but is partly one and partly the other.

Rating and testing personality.—The intelligence tests and special ability tests previously mentioned measure certain *intellectual* and *motor aspects* of personality. Attempts have also been made to measure other personality traits. The methods devised are usually more qualitative than intelligence test methods. Some of them aim to measure mainly affective or *temperamental aspects* of personality. In this category may be placed Woodworth's

[8] William James, *Pragmatism: a New Name for Some Old Ways of Thinking* (Longmans, Green, 1911).

"Test of Emotional Instability," and Pressey's "X-O Tests" for investigating the emotions.

The Woodworth test [9] consists of 116 questions, such as: "Are you often frightened in the middle of the night?" and "Do you feel sad or low-spirited most of the time?" These questions may be answered by yes or no. One of these answers is indicative of emotional abnormality. It was found that the average subject gave about ten abnormal answers, and the relative stability or instability of a subject may therefore be indicated by his deviation from this norm. Many of the questions really pertain to nontemperamental aspects of personality. The Pressey test [10] consists of lists of emotionally significant words which the subject underlines or crosses out according to directions. The results indicate certain affective and moral characteristics. The Pressey test really puts considerable emphasis upon intellectual as well as upon affective factors.

Certain tests have also been devised to measure *character traits*. The Downey "will-temperament" tests [11] are outstanding in this field. These tests measure mainly inhibition and facilitation of response. The responses studied are chiefly those of handwriting, which somewhat limits the general significance of the tests. Other tests have been devised for measuring special traits of character, as aggressiveness, deception, honesty, perseverance, and so forth. There are also tests for more general *personality traits* which involve combinations of intellectual, tem-

[9] See S. I. Franz, *A Handbook of Mental Examination Methods* (Macmillan, 1920), pp. 170-176.

[10] S. L. Pressey, "A Group Scale for Investigating the Emotions," *Journal of Abnormal Psychology*, 16 (1921), 55-64.

[11] J. E. Downey, *The Will-Temperament and Its Testing* (World Book Co., 1923).

peramental and character qualities. Some of these are tests or "rating scales" for introversion-extraversion, ascendance-submission, originality, leadership, effective energy, fair-mindedness, and social or moral judgment.

A number of outlines have likewise been prepared to facilitate self-study or the study of other personalities. Yerkes and La Rue have published an *Outline of a Study of the Self.*[12] It embraces a study of hereditary and environmental influences as well as analysis of the personality. Laird has also prepared a "personal inventory" [13] with special reference to introversion-extraversion and schizoid-cycloid characteristics. One of the most comprehensive and serviceable outlines is F. H. Allport's *Systematic Questionnaire for the Study of Personality.*[14] This questionnaire consists of 176 items, most of which include a number of questions. These items are grouped under the following headings: (1) developmental history, (2) intelligence and abilities, (3) emotional and bodily activity, (4) ambitions, interests, and vocational tendencies, (5) habits of work, (6) recreations, (7) social and moral aspects, (8) sex and family life, (9) attitude toward self and towards reality, and (10) compensation and self-improvement. Any person would benefit by the greater insight attained through a study of himself in accordance with this questionnaire.

ABNORMALITIES OF PERSONALITY

Every mental and physical abnormality is in a sense an abnormality of personality, for personality is the sum-

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[12] Harvard University Press, 1914.

[13] D. A. Laird, "Detecting Abnormal Behavior," *Journal of Abnormal Psychology,* 20 (1925), 128-141.

[14] C. H. Stoelting, 1925.

total of all traits. Some abnormalities are, however, more important from the standpoint of the total personality. Here belong abnormalities which involve certain special elements, like general bodily sensation and memory, upon which personal identity and unity of personality in part depend. Here also belong abnormalities which involve a large number of processes, and especially those which pertain to the organization of processes. Some abnormalities involving the total personality are described in the following pages.

Weakness of personality.—General weakness or deficiency of personality may result from failure to develop as in amentia, or from loss of personality as in dementia. The latter may be called *depersonalization*. In a weak personality the deficiency is in both *content* and *synthesis*. There is dearth of ideas, feelings, and impulses, and at the same time defective organization of the elements that are present. Depersonalization is especially marked in certain organic mental diseases, such as general paralysis of the insane, where the process of deterioration is particularly rapid. A weakness of personality may concern more especially one of its aspects: intellect, temperament, or character. These partial defects have already been described.

Transformation of personality.—This is change in the *content* of personality rather than in its synthesis. There is normally a gradual transformation of personality from childhood to old age. The change is especially noticeable at puberty and the climacteric. This normal transformation is in part due to bodily changes, in part due to experience, and in part to progressive organization of mental processes. Abnormal transformation of personality is characteristic of certain mental diseases which involve

very little mental deterioration. Personality changes occur in the temperamental alternations of manic-depressive insanity, and to a lesser degree in the cyclothymic temperament in everyday life. In such cases, the whole mental content changes in conformity with the change of mood.

Some forms of paranoia afford rather typical illustrations of transformation of personality. The entire mental life may become reorganized under the influence of a delusion of grandeur or of persecution. These marked changes may be described as *repersonalization*. Some degree of repersonalization occurs normally in connection with changes of mood, or as a result of suggestion. Hypnotic suggestion may produce changes of this sort. In fact, hypnosis has been described as a process of depersonalization and repersonalization. There is usually some repersonalization or transformation in physical illness. This is manifested especially in changes of mood with resulting changes in ideation and in interests.

Mental conflict.—Mental conflict was described in a previous chapter. It is an incompatibility or antagonism of thoughts, feelings, or impulses; and is therefore a *disorganizing factor*. It is, however, a normal phenomenon occurring as a stage in the process of development. The desirable or healthful outcome of mental conflict is sublimation, which means that both sides of the conflict remain conscious and obtain adequate expression. But mental conflict may have abnormal consequences. On the one hand, there may be persistence of the conflict with consequent worry and anxiety, and on the other hand, there may be repression and dissociation of one side of the conflict. This may result in indirect expression, overcompensation, and the like, as previously described.

A persistent mental conflict is essentially an abnormality in the integration and organization of personality.

Dissociation of personality.—This is an abnormality in *synthesis* or organization rather than in content. Parts of the personality become inaccessible to consciousness usually as a result of extreme mental conflict. The dissociated parts may be chiefly ideas, chiefly affects, or chiefly impulses. Ideas are dissociated in the forgetting of a well-known name, fact, or event. Similarly, feelings and impulses may be quite outside of consciousness. A situation usually resulting in emotion may leave one subjectively entirely undisturbed, while the correlated bodily responses of emotion may occur and be apparent to an external observer. The dissociated elements frequently constitute so-called "unconscious complexes," which are combinations of ideas, affects, and impulses. As previously pointed out, it is not necessary to suppose that the dissociated and unconscious elements exist as mental phenomena. They may exist merely as dormant neural patterns, or as dissociated neural processes.

Dissociated processes may exist in various degrees of complexity.[15] In the simplest case these processes are not themselves organized or systematized; but they may, nevertheless, be expressed in behavior. For instance, in simple *automatic writing*, the hand moves involuntarily but merely writes disconnected words or phrases. A similar manifestation of relatively simple dissociated processes occurs in *crystal gazing*. Some persons on gazing fixedly at a ball of glass perceive objects, persons, or scenes in the glass. These experiences are often merely simple dissociated memories. For example, a woman in a "crystal

[15] F. L. Wells, *Mental Adjustments* (Appleton, 1917), Chaps. v and vi.

vision" saw herself smoking a cigarette. She was not in the habit of smoking, and did not believe that she had ever done so. She was, however, an alternating personality and had smoked a cigarette in a previous secondary state. Her crystal vision was merely a reproduction of this experience, which she could not remember in her present state.

The dissociated factors may be more highly integrated and organized into complexes, but these may not be sufficiently complicated to constitute a separate personality or ego. In such cases there may be considerable unconscious elaboration of ideas, which may be expressed in automatic writing as meaningful and novel compositions. In crystal visions the scenes are more complicated, and may also be novel in the sense that they are reconstructed out of elements from past experience. Most spiritualistic *mediums* have about this degree of elaboration of the dissociated processes. Hence, in their automatic speech or writing they often produce apparently new material, and usually succeed in deceiving themselves as well as others regarding the origin of this material. The spiritualists believe that the ideas thus expressed are derived from a spirit, which is communicating with the material world through the medium.

The dissociated ideas, affects, and impulses may be sufficiently numerous and well-organized to constitute another personality more or less independent of the main one. This other personality may exist coconsciously, or the two may alternate in their control of the important functions of speech and locomotion. There may even be more than two such personalities associated with the same organism. Neurologically, these personalities must be understood as more or less independent organizations of

neurons and neural patterns in the same brain. Many instances of *multiple* and *alternating personality* have been reported. An inventory recently made contained between twenty and thirty cases. The cases described by James, Sidis, Janet, and Prince are classical examples. One of the most interesting is that of Miss Beauchamp reported by Morton Prince, who sums up the case in the following words:

Miss Beauchamp manifested three secondary personalities, B I, B IV, and "Sally." B I, known as the *"Saint,"* was characterized by extreme piety, religious scruples, and moral traits that are commonly regarded as the attributes of saintliness—meek and dependent, never feeling anger or resentment or jealousy, bearing her hard lot with almost inconceivable patience, never rude or uncharitable, never self-assertive, she might well be taken as typifying the ideals of Christian morality.

B IV was the *"woman":* strong, resolute, self-reliant, "sudden and quick in quarrel," easily provoked to anger and pugnacity, resenting interference and obstruction to her own will, determined to have her own way in all things at all costs, intolerant of the attributes of saintliness, the antithesis of B I, she belonged to womankind and to the world. She may be called the Realist.

Sally, the *child* in character, thought, and deed—a mischievous delightful child, loving the out-door breezy life, free from all ideas of responsibility and care, and deprived of the education and acquisitions of the others—belonged to childhood to which she was in a large measure a reversion.

Here are three personalities sharply differentiated in traits, health, educational acquisitions, tastes, feelings, etc., yet all derived from one and the same person and alternating with one another. . . .

One of them, however, "Sally," besides alternating with the others, had a coconscious existence, in that she persisted as a self, *i.e.,* a separate mental system possessing a differentiated

self-consciousness, while each of the others was present. Thus there were two selves existing at one and the same moment, one coconscious to the other. . . .

Coconscious activity of this kind is most frequently observed under conditions where alternations of personality are not observed. As a phenomenon it is quite common by itself. It is in cases like those of "Lucie" and Mme. B, made classical by M. Janet, and that of Mlle. Hélène Smith, an unprofessional medium, so beautifully studied by M. Flournoy, that coconscious activity can be observed in its most highly developed form. Indeed the phenomena manifested by mediums, who claim through automatic writing and speech to give expression to the thoughts of spirits and send messages from the spirit world, often present the best examples of autonomous coconscious life. . . .[16]

The case described by Prince illustrates an extreme form of dissociation, and a marked difference in the three resulting personalities. Milder degrees of the same phenomenon are more common. Most of us have different selves that appear on different occasions. James has described a number of these selves. He speaks of the "material me," the "social me," and the "spiritual me." [17] He points out that the social self in particular has many different aspects, such as the self revealed at home, the self expressed in one's business relations, and the self manifested in one's club or fraternity. These selves are of course not completely dissociated. They are all known to each other, and merely show themselves in different situations. Sometimes the different selves have different moral qualities as in the classical example of "Dr. Jekyll and

[16] Morton Prince, "Miss Beauchamp—the Theory of the Psychogenesis of Multiple Personality," *Journal of Abnormal Psychology*, 15 (1920), p. 68; quoted from W. S. Taylor, *Readings in Abnormal Psychology and Mental Hygiene* (Appleton, 1926), pp. 459-460.

[17] William James, *Principles of Psychology*, Vol. I, Chap. x.

Mr. Hyde." C. D. Fox has the following to say with reference to this aspect of the subject:

All of us have probably experienced tendencies to do things which were inconsistent with conduct conformable with the obligations imposed by occupation, finances, home life, social status, etc. Being incompatible with our external relations, such thoughts were suppressed. Simply being submerged, these ideas continue to exert a modifying influence upon the better side of the ego, thus producing what might be called an average personality. In fact, we are all both better and worse than we appear to be to others, and our personalities, both as viewed by others and by ourselves, are merely masks which serve to screen the possibilities for good or evil that exist within us. Under favorable circumstances one who has been a criminal may live as an average individual, while if we should transfer the exceptional person to an environment where he is exposed to various stresses, we might bring into evidence traits which neither he nor his friends ever suspected. When dissociation occurs it is but natural that one personality should be lively and not too scrupulous while the other exhibits puritanical tendencies. Study of most of the reported cases of multiple personality shows this difference of moral characteristics.[18]

In the typical case of multiple personality each personality has *amnesia* for the other. In Prince's case, however, one of the personalities, Sally, was aware of the existence of the others and had some knowledge of their mental processes. The other personalities did not know of the existence of each other, or of Sally, except indirectly. Such a one-sided memory indicates that the dissociation was not altogether complete. It comes nearer to "the selves" of the normal person, each of which has knowledge of the others. It is difficult to account for this one-sided

[18] C. D. Fox, *The Psychopathology of Hysteria* (Badger, 1913), p. 331. Quoted by permission.

memory in neurological terms; for it must be supposed that nerve currents pass between the neural system in one direction but not in the other. In the typical case they pass in neither direction. The close relation of amnesia and multiple personality is clearly demonstrated in a case described in detail by Sidis and Goodhart,[19] and summarized by Fox as follows:

While alighting from his carriage the Rev. Thomas Carson Hanna made a misstep and fell, striking his head. Upon recovering consciousness, two hours later, his mind was a blank. Not only had he lost the faculty of speech, but even the ability to recognize objects and persons. He was unable to appreciate distance, form, size, time, etc., and he did not even know how to use his muscles. Though the feeling of hunger was not affected yet he could not interpret the craving, and he was ignorant both of the purpose of food and of the acts of mastication and deglutition. Spatial conceptions having been lost he attempted to grasp a tree seen through a window. Among other curious mistakes he thought a man on a bicycle constituted one living being, while a second man and the horse and carriage that he was driving were another living being of a different kind. In spite of his total amnesia he was very intelligent. At the end of one week of instruction he was able to read, and six weeks after the accident he could talk intelligently. His dreams, derived from experiences of the normal personality, were so vivid that it seemed as if he lived over again past occurrences without, however, recognizing them as such. With hypnoidization the same kind of hallucinations from the past could be obtained. Conservation of the memories of the primary personality was shown also by his ability to solve geometrical problems without being able to explain how he did so.

It was thought that a large number of stimuli whose nature differed from that to which the new personality was accustomed might raise above the threshold of consciousness the submerged

[19] Boris Sidis and S. P. Goodhart, *Multiple Personality* (Appleton, 1919).

memories of his past life. If successful, such a procedure would represent fusion of the two personalities. Accordingly, he was taken to New York and subjected to a lively round of amusements. Two hours after having retired he woke as the normal Mr. Hanna, who was much surprised to find himself among strangers, and in strange quarters. He thought that he had been the victim of some practical joke. During the following six days the two personalities alternated until finally, during a psychic crisis, fusion occurred—the two states became synthetized.[20]

Sometimes a dissociated personality in one of its phases has a tendency to travel or wander about. This has been called a "fugue." It is usually considered a form of hysteria like ordinary dissociated personality, but it has also been regarded as having an epileptic origin. The writer had an opportunity of interviewing a case of this sort. The subject related the following experience:

He was in the city of Baltimore, on business, when he apparently lost consciousness. He awoke several months later to find himself in South Africa in good health and with a considerable sum of money. He had absolutely no memory of the interval but must have been able to conduct himself normally in his social and business relations. He has no idea how he obtained the money and is worried for fear he may have obtained it by immoral methods. He sailed for London in order to return to the United States. On the journey he again lapsed into his secondary personality. The next thing he remembers he was in London very much down-at-heel and without money. He does not know where his money went. He was obliged to go to the American legation for assistance in returning to the United States.

Since that time he has had a number of similar attacks.

[20] C. D. Fox, *op. cit.*, 318-319. Quoted by permission.

He always travels and his secondary personality must be relatively well adjusted because he never gets into any serious trouble in his dissociated state. He has discovered that he has a premonition of an oncoming alternation of his personality. He is now working as an official in a hospital for the insane, and when he has such a premonition he puts himself under observation so that he will be prevented from running away. This premonition is suggestive of the *aura* of epilepsy. Under hypnosis the subject has been able to recall some of the experiences during his wandering periods.

This case may have been a form of epilepsy, but dissociated personality is ordinarily a form of hysteria. Dissociation also occurs in dementia præcox, but this is a more fragmentary dissociation. It is a "shattering of the personality," and is manifested in various forms of incoherence. Bleuler has therefore suggested the term "schizophrenia" instead of dementia præcox for this disease.[21] The term "schizophrenia" means splitting of the mind, and is more suggestive of the nature of the disease. Dementia præcox is thus analogous to hysteria, but a hysterical subject is not usually incoherent. Hysterical dissociation may be regarded as a *massive splitting* into large independently functioning parts, while schizophrenia is a more general dissociation into smaller portions. It is a *fragmentation* of the personality, and a reorganization or synthesis of elements is thus more difficult.

Other abnormalities of personality.—The abnormalities of personality are too varied and manifold for detailed description. An interesting deviation is *imbalance* of the personality. Certain aspects are developed, others

[21] Eugen Bleuler, *A Textbook of Psychiatry* (Macmillan, 1924).

undeveloped. Thus, one or two of the trio, intellect, temperament, and character, may be dominant and highly developed; while the other two or one may remain relatively undeveloped. Another abnormality is extreme *narrowness* of personality. This may be due to deficiency of knowledge, to limitation of interests, or to lack of skills and social habits. In other words, it may be manifested in intellect, temperament, character, or in all three.

There may also be abnormality in modes of expression of the personality, or in special traits. There may be *extreme introversion* in which the subject is entirely detached from the world of reality and living in an ideal or fantastic world of his own creation. There may be *extreme extraversion* in which the subject is wholly determined by external factors and situations, and leaves no imprint of his individuality upon the external world. There may also be extremes of other traits, of radicalism, conservatism, ascendency, submissiveness, persistence, and so forth. Abnormality in any mental or physical trait will have its effect, however small or great, upon the total organization called personality. The distinction between normal individual differences and abnormal variations in personality is wholly arbitrary, and we have therefore merely indicated the nature of the variations and described a few of the more extreme forms.

CHAPTER XXVIII

PSYCHOPATHOLOGY

The survey of normal and abnormal psychology really ended with the last chapter. This chapter and the following one are added in order to indicate certain important relationships and distinctions, and to suggest allied topics for further study. Psychopathology, as the term implies, is the psychology of disease and defect. It is thus only a part of abnormal psychology, and must not be identified with it. Abnormal psychology treats of all marked deviations from the "central tendency" or norm, regardless of whether these deviations are due to disease or to other factors. Some psychopathology has been scattered throughout this book in connection with the discussion of the various abnormalities. In the present chapter it is desired to indicate the general scope of the subject, and to present an epitome of the psychology of some of the main pathological conditions or diseases. These conditions and diseases are, of course, described only from the psychological standpoint; and most of them have been referred to frequently in the previous chapters.

Psychopathology must not be confused with *psychiatry*. The latter is a medical specialty, an art or practice based on various sciences, as well as upon personal experience in handling and treating patients. Psychiatry is more inclusive than psychopathology. It involves the study of all the symptoms of mental disease and defect, physical as well as mental. Biochemistry may contribute as much to

psychiatry as psychopathology does. Psychiatry also includes the treatment of mental diseases and the care of the insane. Psychopathology is merely the psychology of the disease, the description and explanation of the mental and behavior symptoms. It is concerned with the physical aspects only in the same way and to the same extent as general psychology is so concerned.

The concept of *insanity* may be considered in this connection, since it is frequently confused with the concept of mental disease. Insanity is really a social or legal concept rather than a medical or scientific one. The term is applied to cases where the abnormality is serious enough to warrant commitment to an institution. A person who is so diseased or maladjusted that he is a menace to the community or to himself is legally insane. Hence a person may be mentally diseased without being insane. Patients afflicted with psychoneuroses or epilepsy rarely require commitment to an institution. It was previously pointed out that a person may be abnormal without being mentally diseased or psychopathological. It is now likewise asserted that a person may be mentally diseased without being insane.

Psychopathology although not as broad as abnormal psychology is nevertheless a quite extensive subject. It embraces the psychology of a considerable variety of diseases, defects, and conditions. It includes the psychology of the *psychoses* or major mental diseases, and the psychology of the *psychoneuroses* or minor mental diseases. It also includes the psychology of *epilepsy* and of mental defect or *feeble-mindedness*. It may likewise be regarded as embracing the psychology of the *effects of drugs*, and the study of the mental aspects of ordinary *physical diseases*. All these conditions have, of course,

other aspects as well as the psychological, which must be considered by psychiatrist or physician. Psychopathology would obviously require a volume in itself, and it is therefore possible to present here only brief descriptions of the psychological aspects and syndromes of the more common diseases and conditions. These descriptions should be regarded merely as introductory to psychopathology. It is assumed that the reader is familiar with the psychological terminology defined in the previous pages of this book.

Psychology of ordinary physical illness.—The psychology of the ordinary physical diseases has received very little attention. It is, however, a subject of considerable interest and importance, and might be studied to advantage by the practicing physician as well as the psychologist. Physical diseases usually involve *variations in mood* with consequent changes in general mental content and a tendency towards repersonalization. The psychological symptoms in fever are particularly marked. These often include flight of ideas and psychomotor excitement. In extreme cases there also occur clouding of consciousness, hallucinations, and perhaps fleeting delusions. Such symptoms are easily observable, but probably all physical diseases present some less marked psychological aspects.

It is a common observation that patients with pulmonary tuberculosis are optimistic and even mildly euphoric,[1] while patients suffering from diseases of the liver are pessimistic, melancholy and hypochondriacal. These observations require verification by psychological study of a large number of cases. The prevalence of the view that liver disease causes despondency is indicated

[1] A. M. Muhl, "Fundamental Personality Traits in Tuberculous Women," *Psychoanalytic Review*, 10 (1923), 380-430.

by the answer frequently given to the question: "Is life worth living?" The reply with a double meaning is: "It depends upon the liver." A similar pessimistic outlook occurs in diabetes. In this disease there may be in addition to depression some melancholy delusions, and a somnolence or drowsiness which may terminate in actual coma. Influenza may also be followed by lethargy and depression. It is likewise commonly supposed that dyspepsia produces irritability, and that cardiac diseases are associated with nervous anxiety.

Southard has suggested a rough correlation between the location of a disease and the accompanying feelings.[2] He pointed out that diseases above the diaphragm are frequently accompanied by pleasant feelings, while diseases below the diaphragm are more likely to be accompanied by unpleasant feelings. The mental symptoms of a physical disease may be either the direct result of the disease, or an indirect consequence of the patient's attitude towards his illness. In either case, but particularly in the latter, it is important that the physician should take mental symptoms into account, and sometimes direct his treatment towards these symptoms, since they may be important factors in preventing or hastening recovery.

Effects of drugs.—The effects of drugs are similar to the effects of autacoids produced by glands of internal secretion. Drugs in general are either *stimulating* or *inhibiting* in their action upon the nervous system. These effects may be either *general,* involving the whole nervous system; or *specific,* involving only special parts, such as motor end-plates, motor neurons, sensory neurons, sub-

[2] E. E. Southard, "Data Concerning Delusions of Personality with Note on Association of Bright's Disease and Unpleasant Delusions," *Journal of Abnormal Psychology,* 10 (1915), 241-262.

cortical centers, or specific areas of the cortex. Moreover, the effects of small doses of a drug may be different from those of large doses; and the effects of doses of various sizes therefore require special study.

Furthermore, the effects of occasional use of a drug must be distinguished from the results consequent upon its continuous use. The psychology of the drug addict is thus a special topic of considerable interest and importance. Moreover, chronic addiction to a drug may result in a psychosis presenting characteristic symptoms. For example, alcoholism may result in delirium tremens or alcoholic hallucinosis, while the chronic use of morphine may result in morphinomania. Such psychoses present marked mental and physical symptoms which will not be discussed here. The psychology of the effects of drugs is thus an extensive subject upon which a considerable amount of literature has accumulated.[3] Much of this literature is of an observational or literary rather than an exact scientific nature.

Experimental studies on the effects of drugs have been made by both psychologists and pharmacologists. Hollingworth's study of the psychological effects of *caffeine* may be mentioned by way of illustration.[4] He eliminated the effect of suggestion upon his subjects by giving them doses in capsules and sometimes giving "control doses" containing no caffeine. It is extremely important in all experiments on the effects of drugs to rule out the influence of suggestion by the use of control doses and control groups of subjects. Hollingworth found that the effect of

[3] For summary of work done and bibliography see M. F. Meyer, "The Psychological Effects of Drugs," *Psychological Bulletin,* 19 (1922), 173-182.

[4] H. L. Hollingworth, "The Influence of Caffein on Mental and Motor Efficiency," *Archives of Psychology,* 1912, No. 22.

caffeine depended upon the bodily weight of the subject. The heavier a person is, the larger the dose required to produce an effect. As a rule, doses up to three or four grains increased speed and accuracy of both motor and mental performances. Doses from four to six grains had a similar effect, but produced some unsteadiness in persons of only average weight. So far as could be determined by experimental technique, there were no bad after-effects with doses of these amounts. Caffeine is thus in general stimulating in its effect.

Alcohol, on the other hand, has an inhibiting effect. In small doses it seems to have an exciting effect, but this is due to the fact that the higher mental functions and inhibitory processes are the first affected. This results in loss of control and consequent increased activity. The symptoms of mild alcoholic intoxication resemble the symptoms of the manic phase of the manic-depressive psychosis. In the second stage of alcoholic intoxication, the inhibition extends to the lower and more automatic functions. This is shown in indistinct speech, unsteady gait, and general incoördination of movement. In the final stage there may be complete coma or loss of consciousness.

Alcohol has different effects on different persons, depending upon their susceptibility to the drug and upon their general personality make-up. Incipient psychopathic tendencies may be brought out in alcoholic intoxication. Prolonged and excessive use of alcohol may result in mental deterioration and other characteristic symptoms. This condition is known as "chronic alcoholism." On the basis of this chronic alcoholism, there may develop certain intercurrent psychoses such as "delirium tremens" and "alcoholic hallucinosis." In these diseases alcohol is the most important exciting cause, but it is not alone

responsible for the outcome. There are also individual predisposing causes: "To become alcoholic one must be alcoholizable."

Morphine does not seem to be quite so general in its effects. It usually facilitates thought but inhibits activity. It also produces a mild euphoria and marked visual hallucinations. The effects in the "period of initiation" appear to be on the whole pleasant. They have been described in the following classical way by Thomas De Quincey in his *Confessions of an Opium Eater.*

> O just, subtle, and all-conquering opium! that, to the hearts of rich and poor alike, for the wounds that will never heal, and for the pangs of grief that "tempt the spirit to rebel," brings an assuaging balm;—eloquent opium that with thy potent rhetoric stealest away the purposes of wrath, pleadest effectually for relenting pity, and through one night's heavenly sleep callest back to the guilty man the visions of his infancy, and hands washed pure from blood;—O just and righteous opium! that to the chancery of dreams summonest, for the triumphs of despairing innocence, false witnesses, and confoundest perjury, and dost reverse the sentences of unrighteous judges;—thou buildest upon the bosom of darkness, out of the fantastic imagery of the brain, cities and temples, beyond the art of Phidias and Praxiteles, beyond the splendours of Babylon and Hekatómpylos; and, "from the anarchy of dreaming sleep," callest into sunny light the faces of long-buried beauties, and the blessed household countenances, cleansed from the "dishonours of the grave." Thou only givest these gifts to man; and thou hast the keys of Paradise, O just, subtle, and mighty opium!

Morphine has thus a seductive influence upon the beginner; but the effects resulting from chronic addiction to the drug are very different from those described by De Quincey. It produces a variety of psychotic symptoms,

mental deterioration, and various delusions, and is likely to terminate in death.[5]

The effects of *cocaine* are somewhat similar to those of morphine except that it causes motor excitement in the beginning, instead of motor retardation. Its continuous use may also result in a definite psychosis. These examples will suffice to show that the psychology of the effects of drugs constitutes an interesting part of psychopathology which would amply repay further study by the student or physician. Some drugs result in special symptoms, such as marked visual hallucinations, and may therefore be used to produce these special symptoms for psychological study of the mental processes concerned.

The psychology of mental defect.—The chief psychological factor in mental defect is deficiency of intelligence, which manifests itself in poor intellectual, motor, or social achievement. The general "cultural status" remains low. This status can be measured by means of intelligence tests, previously described. However, deficiency of intelligence is not the only psychological aspect of mental defect. There are various cognitive symptoms, such as inattention, distractibility, and deficient imagination. There are also affective symptoms, like apathy and emotional instability; and there are various disorders of behavior and general conduct. The different degrees of mental defect, moronity, imbecility, and idiocy, have already been mentioned. Mental defect is sometimes combined with mental disease or with epilepsy. In these cases there is a much greater variety of mental symptoms. There are likewise usually well-marked physical aspects of feeble-mindedness. This is particularly true of cre-

[5] See T. D. Crothers, *Morphinism and Narcomanias from Other Drugs* (Saunders, 1902).

tinism and mongolianism, but it holds to a lesser degree of other clinical forms of mental defect.[6]

The psychology of epilepsy.—Epilepsy is a disease with marked mental symptoms. It is "characterized by recurrent paroxysms which are abrupt in appearance, variable in duration but usually short, and in which there is impairment or loss of consciousness, together with impairment or loss of motor coördination, with or without convulsions."[7] There are two forms of epileptic seizure without convulsions. One is called a *petit mal* attack, which is a momentary loss of consciousness or "absence." The patient merely stops for a few seconds in the midst of his work or conversation and then proceeds in the usual way. The other form without convulsions is the "epileptiform equivalent." This is a period of marked excitement, confusion, and automatism. In this case the patient may wander away on long journeys, or do things that he cannot remember afterwards. There is some question as to whether these "absences" and "equivalents" are epileptic or psychoneurotic phenomena. They are sometimes referred to as "psycholeptic attacks," and regarded as psychological in origin and analogous to flight from reality. The main characteristics of epilepsy are summed up briefly by Southard and Jarrett in the following words:

> Epilepsy is ordinarily a disease with at least (*a*) unconsciousness and (*b*) convulsions. An attack of unconsciousness alone does not constitute epilepsy and does not in itself prove the existence of epilepsy. Neither would a single convulsion, even

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[6] For description of clinical types, see A. F. Tredgold, *Mental Deficiency* (Wood & Co., 1914).

[7] W. P. Spratling, *Epilepsy and Its Treatment* (Saunders, 1904).

though it were very characteristic in its appearance, prove the existence of epilepsy. If, however, the diagnosis of epilepsy is once established through medical observation of several attacks of unconsciousness with convulsions, then it becomes possible for the physician to identify certain *minor attacks* and disorders of consciousness with little or no evidence of convulsions, as epileptic. Accordingly when fainting spells, abstraction, blank feelings, and episodes of loss of memory occur, the physician is very apt to think of the possibility of epilepsy.

Modern work seems to have shown that there is an *epileptic temperament* or personality in which self-consciousness (egocentricity) and inharmony and irritability are found. The epileptic mind seems, on the whole, a little childlike, even when there is little proof of feeble-mindedness. Modern study of *epilepsy* has shown that it is much *more exact to speak of epilepsies than of epilepsy.*

The major or so-called *grand mal* attack of epilepsy consists in a fall with unconsciousness and spasm. The spasm is at first a steady tonic spasm, but there shortly appear interrupted or clonic spasms. Automatic movements follow these clonic spasms. The patient then either wakes up or passes into a deep sleep. On waking the victim feels lame and weak in the convulsed muscles, and his head may ache. There is often absolutely no warning of these attacks though very striking warnings or so-called *auræ* (such as flashes of light, sounds, or smells) may occur and as a rule always in exactly the same form. The muscles are apt to be affected, always in the same order, and the convulsion is then said to "march" in a characteristic way. Tongue-biting and frothing at the mouth are observed, and the patient may involuntarily urinate. . . .

It seems to have been proved that the epileptic attack of the nature above described may sometimes be represented by an acute mental attack without convulsion and even without evident loss of consciousness. Such an attack without characteristic features of epilepsy is termed an epileptiform equivalent. The patient may fall into a state of automatism or into a dream-state in which violent and destructive or criminal acts get done, of which the patient will have no remembrance. The

crimes of violence committed by epileptics may be of the greatest brutality.[8]

The *causes* of this peculiar disease are not definitely known. It was first supposed to be a disease of the medulla, then of the cornu ammonis, and finally of the cerebral cortex. According to one view, the cortical neurons are unstable and irritable, and they are therefore occasionally thrown into violent and explosive activity by some trivial cause. Some investigators have found changes in the cortex. According to Spratling the most striking changes are in the sensory cells of the second cortical layer. This makes epilepsy "a sensory disease with a motor manifestation." The cell changes are probably due to the action of some toxic agent. The epileptic fit may be due to periodic accumulation of toxins which are eliminated during the convulsion, thus accounting for the rapid recovery. Such toxins might be of endocrinal origin. There is also a theory that the convulsion is due to sudden removal of cortical blood supply. This might be a result of fall of blood pressure, or of local cortical vasoconstriction. The occurrence of the assumed circulatory disturbance is not explained.

THE PSYCHONEUROSES

The psychoneuroses are *functional* nervous or mental diseases. This means that no alterations are discoverable in the nervous system. They are thus distinguished from *organic* diseases in which gross or microscopic changes are found. The functional diseases may also have an organic basis, in the sense that changes occur in the rela-

[8] E. E. Southard and M. C. Jarrett, *The Kingdom of Evils* (Macmillan, 1922), pp. 469-470. Quoted by permission.

tionship of parts of the nervous system, as in the connections of neurons and neurograms. These changes may be in synapses rather than in neurons, and may result in abnormal variations in resistance of synapses. A functional nervous disease may be likened to an automobile, which lacks gasoline to drive it, or oil to make it run smoothly; or which needs an adjustment of the carburetor or timing gear. An organic disease is comparable to an automobile in which a part is worn out or broken. There are three main kinds of psychoneuroses: hysteria, psychasthenia, and neurasthenia.

Hysteria.—There is practically no limit to the number of symptoms that may occur in hysteria. This functional disorder may simulate almost any organic disease or symptom. It is thus possible to mention only a few of the more common symptoms. One group of symptoms are the *anesthesias* or losses of sensation. These anesthesias may involve any sense department, and they have the characteristics of functional anesthesia described in Chapter VII. The loss of sensation may be partial or complete. Hysterical contraction of the field of vision is common, but total hysterical blindness likewise occurs. Cutaneous anesthesia is perhaps the most common form of loss of sensation. Anesthetic areas of the skin were at one time regarded as evidence of demoniacal possession. In the days of witchcraft suspected persons were tested with a pin, and if insensitive areas were found it was regarded as proof of guilt.

A second group of hysterical symptoms are the *paralyses and contractures*. These paralyses may involve any part of the body, as arm, leg, face, or vocal organs. The paralysis may be transitory or of considerable duration, and may come on and disappear suddenly. In

some cases the bodily organ is paralyzed for certain functions and not for others. The legs may be paralyzed for walking but not for dancing; the hand may be paralyzed for writing but not for other movements, and so on. This suggests that the paralysis may be related to some unconscious motive. Functional paralyses are sometimes cured by an energizing experience, such as an emotional shock or an accident. A person who has been paralyzed for years may jump up and run when it is necessary to escape from a fire, and may continue to walk thereafter.

Another group of symptoms constitute the *hysterical temperament,* which is characterized by emotional instability. Hysterical laughing and crying are well-known symptoms. The hysterical temperament is also hypersensitive. The feelings are easily hurt, and the subject frequently craves sympathy and attention. Other symptoms are *suggestibility, amnesia,* and *alternation of the personality.* These have all been described in previous chapters. Peculiar "hysterical fits" or attacks are likewise common. These attacks take various forms, as nausea, epileptoid attacks, somnambulism and fugues, and cataleptic or "trance states." In the past, many religious leaders have manifested such phenomena, and the spiritualist mediums of the present day show similar symptoms of hysteria.

All the symptoms of hysteria are based upon *dissociation,* which may therefore be regarded as the fundamental characteristic of the disease. Janet has defined hysteria as a "form of mental depression characterized by the retraction of the field of personal consciousness and by the tendency to the dissociation and the emancipation of systems of ideas and of functions which by their

synthesis constitute the personality." [9] He holds that this narrowing of consciousness and dissociation depend upon an inborn weakness of mental synthesis, and upon exciting factors such as mental stress or emotional shock.

Prince likewise regards hysteria as a form of dissociation.[10] It may be illustrated by the cases of multiple personality described in the last chapter. Prince holds that the dissociated systems and processes may be active and perhaps coconscious. Others believe that the dissociated parts are always dormant. For instance, Sollier defines hysteria as *vigilambulism* by analogy with somnambulism.[11] The latter is a partial waking while sleeping, and the former is a partial sleeping while waking. This merely means that in hysteria the dissociated neural systems are dormant or inactive. The symptoms manifested depend upon the brain centers thus affected.

Babinski regards hysteria as a state of increased *suggestibility*.[12] This view is quite compatible with the theory of dissociation. It has been pointed out that suggestibilty is an aspect of dissociability. Hence the two symptoms will occur together. It is true that hysterical symptoms may be produced by suggestion, and that they can be removed in the same way. Therapeutic suggestions may be given by a physician or by a faith healer, or they may be involved in a visit to a shrine noted for its cures. In such cases the cures often appear miraculous: the blind see, the lame walk, the deaf hear, and the dumb speak.

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[9] Pierre Janet, *The Major Symptoms of Hysteria* (Macmillan, 1920).

[10] Morton Prince, "Hysteria from the Point of View of Dissociated Personality," *Journal of Abnormal Psychology*, 1 (1906), 170-187.

[11] Paul Sollier, *Genèse et nature de l'hystéria* (Paris, 1897); and *L'hystéria et son traitement* (Paris, 1901).

[12] Joseph Babinski, "My Conception of Hysteria and Hypnotism," *Alienist and Neurologist*, 29 (1908), 1-29.

The psychoanalysts have emphasized the view that hysterical symptoms are indirect and symbolical manifestations of *repressed complexes* or impulses.[13] This view is not incompatible with the theory of dissociation. It may be regarded as an attempt to carry the analysis a step further by giving a psychological cause for dissociation and for the exact nature of the symptoms. Dissociation is a result of mental conflict and repression. Thus repressed impulses and complexes are the unconscious motives for the symptoms. It has long been recognized that hysterical symptoms are motivated by the patient's impulses and desires. He is sick because he wants to be sick, or gains some satisfaction out of sickness.

It is, however, important to distinguish between *hysteria* and *malingering*. The malingerer consciously simulates a symptom such as paralysis in order to avoid a disagreeable task. A hysterical patient may develop a similar symptom with the same motive, but he is not conscious of this motive or only dimly conscious of it, and he is certainly not conscious of the relation of the motive to the symptom. In other words, the hysterical patient may know he wants to avoid a disagreeable duty, but he does not know that this is the cause of his illness. Thus, a person who pretends he has a headache in order to avoid a social engagement is a malingerer, but a person who actually develops a headache on such an occasion is hysterical. The motive unconsciously produces the symptom and thereby prevents the necessity for lying. It follows that the removal of a hysterical symptom will be facilitated, if the patient is made aware of his motive and its relation to his symptom; but in order to effect a complete cure

[13] Sigmund Freud, *Selected Papers on Hysteria and Other Psychoneuroses*, Nervous and Mental Disease Monographs, No. 4 (1909).

the motive itself would need to be changed or expressed in some other way.

Psychasthenia.—Psychasthenia was first described as a distinct disease by Janet. It corresponds to the "obsessional neurosis" and "anxiety neurosis" of Freud. It is characterized by recurrent and irresistible obsessions. These obsessions are of three main kinds. The mind may be besieged by ideas, by affects, or by impulses. The *obsessing ideas* take the form of imperative or fixed ideas. The subject is haunted by some persistent thought or question. The *obsessing affects* may be any feelings or emotions, but the most common are obsessing fears or phobias. A phobia is usually of some particular object, and there is scarcely anything about which a fear may not be developed. But a phobia may also be general, nameless or vague, like the fear of impending disaster. The *obsessing impulses* are exaggerated instinctive or habitual tendencies and are called "manias." They range from simple acts, such as biting the nails or grimacing, to complex and socially significant behavior, like setting fires or stealing.

Another characteristic of psychasthenia is the *feeling of unreality*. Everything seems strange, as if in a world of dreams. Somewhat analogous to this is the feeling of *personal inadequacy* and incompleteness. These feelings of unreality and inadequacy are suggestive of Tennyson's poetic description of the lotus eaters. Mental conflict is also manifested in psychasthenia in the form of *doubt* and *indecision*. "In extreme psychasthenia the difficulty of 'making up the mind,' of deciding, becomes so great that a person may suffer agonies of internal debate about crossing the street, putting on his clothes, eating his meals, doing his work, about every detail of his coming,

going, doing, and thinking. A restless anxiety results, a fear of insanity, an inefficiency and an incapacity for sustained effort that results in the name that is often applied,—'anxiety neurosis.' " [14]

Janet regards the feelings of unreality and inadequacy as fundamental.[15] These feelings are due to *"lowering of the psychological tension."* This lowered tension can be thought of as a general looseness of synthesis. There is thus a close relation between psychasthenia and hysteria, but in the latter, dissociation is more complete. Janet holds that psychasthenic fear is sometimes consequent upon an inadequate perception of reality; it is a fear of the unknown. At other times it is a result of the feeling of inadequacy. The patient is afraid he will not be able to achieve a desired or acceptable standard of behavior. His fear is thus a "fear of action."

Freud regards the obsessions as the basic symptoms.[16] These obsessions are due to *overcompensation* for a repressed wish or impulse of a sexual nature. Fear overcompensates for desire, and there is then a *transference* of the affect to some associated idea which represents the thing desired. Prince also believes that the obsession is determined by *subconscious dissociated processes.*[17] Here, however, his agreement with Freud ends. He holds that the obsession is merely a small part of a larger system of mental processes which are dissociated and subconscious. Thus the emotion pertaining to an idea may

[14] Abraham Myerson, *The Nervous Housewife* (Little, Brown, 1920), p. 32.

[15] Pierre Janet, *Les obsessions et la psychasthénie,* especially Vol. I, Part 2 (Paris, 1903).

[16] Eduard Hitschmann, *Freud's Theories of the Neuroses* (Moffatt, Yard, 1917), pp. 164-188.

[17] Morton Prince, *The Unconscious,* pp. 363-422.

emerge into consciousness, while the idea itself remains submerged. An obsession would be readily accounted for, if the unconscious elements could be brought into consciousness. It would then appear as a much more logical phenomenon.

Neurasthenia.—The outstanding symptom of neurasthenia is the *feeling of fatigue*. Sleep fails to remove this symptom, and the patient may feel more tired on rising than when he went to bed. He often takes the major part of the day to get wakened up, and then at night he is unable to go to sleep. This fatigue is manifested in mental processes as well as in physical activity. The mental fatigue may take the form of *inability to attend* or to put forth effort. It may also take the form of fatigue of the affective processes, which is shown in *emotional inadequacy* and *instability*. The neurasthenic is, moreover, *hypersensitive*. He magnifies the little pains and aches, and the minor difficulties of everyday life. This symptom is no doubt closely related to the increased fatigability.

The neurasthenic has also a *capricious appetite* and is liable to various kinds of digestive disturbances, which seem to have an emotional basis. Furthermore, the neurasthenic *worries* about everything. Worrying is a form of anxiety and is based upon unresolved mental conflict. The neurasthenic worries about his business and about his family, but particularly about his health. This form of worry is called *hypochondria*. The neurasthenic is afraid of mental or bodily disease and is continually consulting physicians and having medical examinations. He is consequently the prey of various kinds of charlatans, who usually find the dreaded diseases and prescribe for them.

Neurasthenia may be due to definite physical causes.

The fatigue may be *true fatigue,* the result of overwork or of illness. Patients convalescing from physical illness usually pass through a neurasthenic phase. In these cases there is either an actual accumulation of fatigue toxins, or an excessive drainage upon the sources of energy. Neurasthenia may also be of *endocrinal origin.* It may be a result of inadequacy of certain glands, adrenal, thyroidal, or gonadal. It is well-known that muscular asthenia is sometimes due to adrenal insufficiency, and other glands may play a similar rôle in producing neurasthenic symptoms.

On the other hand, neurasthenia may be due to more definitely mental causes. Anxiety and worry are frequently dependent upon persisting *mental conflicts.* Such conflicts result in a blocking of forces and an internal dissipation of energy with consequent feelings of fatigue. If conflict results in repression and dissociation, energy becomes thereby blocked off and not available for use. Neurasthenia is essentially a *deënergization.* Energy is either actually reduced or is made unavailable through conflict or dissociation.[18] Freud emphasized the sexual etiology of neurasthenia,[19] but the sexual factors are only significant if they result in conflict and repression.

Prince and others have described cases in which neurasthenia was apparently related to *dissociated and alternating personality.*[20] For instance, one of the personalities in the Beauchamp case was distinctly neurasthenic. It is reasonable to suppose that in such cases feelings and memories of fatigue become integrated with other mental

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[18] Abraham Myerson, *When Life Loses Its Zest* (Little, Brown, 1925).
[19] Eduard Hitschmann, *op. cit.,* pp. 16-43.
[20] See J. E. Donley, "Neurasthenia as a Disintegration of Personality," *Journal of Abnormal Psychology,* 1 (1906), 55-68.

processes into one of the personalities, and thus persist when actual fatigue has been removed. Similarly, feelings of fatigue may enter into some of the repersonalizations of ordinary people, and account in part for their neurasthenic periods.

THE PSYCHOSES

The psychoses are the more serious, major mental diseases. Patients suffering from psychoses are usually insane in the legal sense; they can be committed to a mental hospital. Many of the major psychoses are obviously *organic* diseases. Alterations in the nervous system can readily be found in post-mortem examination. The mental symptoms of organic diseases are usually quite varied, and depend upon the locus and extent of the cerebral lesions. These symptoms are of considerable psychological interest. Their study has contributed much towards our understanding of human nature, and has extended our knowledge of the correlation of mental and physical processes.

Other psychoses are less clearly organic diseases. Cortical changes cannot readily be found and authorities disagree as to their ultimate nature. Some hold that they are *functional,* while others believe they are organic. Thus there are "mind twist" and "brain spot" hypotheses regarding such diseases. The psychology of these disorders is of even greater interest and importance than the psychology of the obviously organic diseases. Only a few of the more common psychoses are described here, and these from a purely psychopathological standpoint.

General paralysis.—This disease is otherwise known as *paresis* and *dementia paralytica.* It is a nervous and mental disease resulting from a form of cerebral syphilis.

It is characterized by progressive mental deterioration leading to complete dementia; and by physical symptoms leading to weakness, incoördination, paralysis, and finally death. The disease usually appears in middle life, and its course is generally from three to five years. In the early stages the *symptoms are neurasthenic* in character. There are feelings of fatigue, general malaise, numerous aches and pains, hypochondria, and so forth. At this stage impairment of judgment is also noticeable, and may lead to social improprieties and disastrous business ventures.

As the disease progresses, *mental deterioration* becomes more obvious, and marked *disorders of motility* also occur. The latter are shown in tremors and in loss of the finer muscular coördinations. There result characteristic forms of gait, speech, and writing. The speech is "drawling" or "slurred," and syllables may be omitted or reduplicated. Similar anomalies may occur in the writing, and behavior in general is untidy and slouchy. A great variety of *mental symptoms* may occur. Various forms of imperception, and marked amnesia and paramnesia are usually found. The mood may be euphoric, depressed, or apathetic. Delusions are also common and may be grandiose or melancholy in conformity with the mood.

In the final stages the *dementia* becomes more profound, *physical helplessness* is complete, and *death* follows. General paralysis is thus fundamentally a physical disease, and must be diagnosed on the physical rather than the mental symptoms. The mental symptoms are extremely interesting but are more varied and less significant than the physical ones.

General paralysis is a typical organic mental disease and is described briefly here merely as an illustration of

a large group of such diseases. The reader is referred to standard books on psychiatry for a more complete account of general paralysis; and for descriptions of other organic mental diseases, such as senile dementia and the various arteriopathic disorders. Senile dementia will be found especially interesting, because the characteristics of ordinary senility occur in this disease in an exaggerated form, thus throwing into relief processes normal to a particular period of life.

Manic-depressive psychosis.—This disease is not so obviously organic. It is primarily an affective psychosis, marked by emotional oscillations and a tendency to remission and recurrence. In this psychosis there is no mental deterioration or dementia. A fundamental characteristic of the disease is the *alternation from depressed to euphoric moods*. Jelliffe has shown that manic-depressive patients previous to the onset of the psychosis possessed *cyclothymic* temperaments.[21] The disease may be regarded as an exaggeration of this temperament, and it has thus a manic phase and a depressed phase. As the patient passes from one phase to another, there is a complete transformation of the personality, a repersonalization. All the mental contents change in conformity with the change of mood.

The *manic phase* is characterized by flight of ideas, psychomotor excitement or hyperactivity, and a euphoric mood. Sometimes irritability takes the place of euphoria. But there are always marked self-confidence, self-assertion, and self-display. There may be fleeting delusions of grandeur in agreement with the general feeling-tone. The

[21] S. E. Jelliffe, *Cyclothymia—the Mild Forms of Manic-Depressive Psychoses and the Manic-Depressive Constitution*, Nervous and Mental Disease Monographs, No. 9 (1912), pp. 193-208.

mania may exist in various degrees; and in the milder forms it suggests alcoholic intoxication. The activity of the patient may appear like a "joyous rough-house." In the more extreme forms the patient may get altogether out of hand, and it is necessary to curb his activity by drugs, hot baths, or physical restraint. A slight *hypomania* may increase a person's efficiency. Some very competent and energetic salesmen are chronicly hypomaniacal. One patient, whose maniacal attacks were not severe, used to leave the hospital and make enough money during his manic phase to tide him over his depressed phase in an expensive private sanatorium.

The *depressed phase* is characterized by retardation of thought or "thinking difficulty," psychomotor retardation, and a depressed mood. There are also marked self-abasement, submission, and feelings of inferiority. Sometimes the affective life is dominated by fear and apprehension. There are likewise occasionally transient delusions which are usually hypochondriacal or self-accusatory, in keeping with the depression. The depression also occurs in different degrees from simple melancholia to the most profound lethargy and even stupor. These "benign stupors" [22] are difficult to distinguish from the catatonic stupors of dementia præcox. The distinction is, however, important, because the prognosis is much better in manic-depressive stupor.

There are various *mixed forms* of the manic-depressive psychosis, and in these states there is a combination of manic and depressive symptoms. Some of these mixed forms are given special names, as "agitated melancholia," and "maniacal stupor." In agitated melancholia

[22] August Hoch, *Benign Stupors, a Study of a New Manic-Depressive Reaction Type* (Macmillan, 1921).

there are flight of ideas and psychomotor excitement, but at the same time emotional depression. The patient is active, restless and talkative, but extremely unhappy. He weeps, moans, and wrings his hands in distress. This form frequently occurs as "involutional melancholia" in late middle life. Maniacal stupor is just the reverse. There is retardation of thought and action combined with markedly pleasant feelings. The patient is quiet and silent, but beams with happiness, and appears to be in a state of ecstasy.

The fundamental nature of the manic-depressive psychosis is unknown. Some authorities have reported the discovery of changes in the cortex. Southard, for example, found changes within the cell bodies of the neurons.[23] Such cell changes if they occur are of a recoverable nature and are probably due to *auto-intoxication.* This poisoning might result from glandular disorders, from digestive disturbances, or from focal infections. Even if no changes prove to occur in the neurons themselves there might nevertheless be a poisoning of the nervous system involving the synapses. It has also been suggested that the disease is a result of a *vasomotor disorder,* which causes anemia or hyperemia of the brain. The problem is then raised as to the nature and cause of the vasomotor disturbance.

Dementia præcox.—The term dementia præcox was first used by Kraepelin to include a number of diseases previously regarded as separate entities.[24] The term implies a form of mental deterioration occurring early in life.

[23] E. E. Southard and H. W. Mitchell, "Melancholia with Delusions of Negation: Three Cases with Autopsy," *Journal of Nervous and Mental Diseases,* 35 (1908), 300-314.

[24] Emil Kraepelin, *Dementia Præcox and Paraphrenia,* translated by R. M. Barclay (Edinburgh, 1919).

The disease usually develops before the twenty-fifth year, but it may occur much later; and the mental deterioration is often more apparent than real. Bleuler has therefore suggested the term "schizophrenia" as being more descriptive of the actual condition.[25] The fundamental characteristic of the disease is a *general dissociation* of the personality, but this dissociation is more complete than in hysteria. It is a "shattering" or "fragmentation" of the personality. Hoch has shown that schizophrenia develops on the basis of a "shut-in" personality.[26] This is a seclusive, retiring type that tends to shrink from all contact with life. Kretschmer has described it as "schizoid personality," and has pointed out that it is likely to be associated with the asthenic bodily type.[27]

The fundamental dissociation manifests itself in various ways in thought, feeling, and behavior. Only a few of the more significant symptoms are described here. A symptom obviously determined by dissociation is *incoherence* in the sequence of ideas. This was described and illustrated in Chapter XV. A similar incoherence is observable in feeling and conduct. One of the first symptoms to be manifested is *deterioration of the affective life.* This results in apathy and loss of interest as well as in variability and instability of emotion. Moreover, the feelings do not fit the ideas, and the affective responses are consequently absurd and grotesque. The patient laughs in a serious situation, or may weep in the midst of a funny story. His "emotional flurries" have no observable relation to the situation or to his other responses.

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[25] Eugen Bleuler, *Textbook of Psychiatry.*

[26] August Hoch, "Constitutional Factors in the Dementia Præcox Group," *Review of Neurology and Psychiatry,* 8 (1910), 463-473.

[27] Ernst Kretschmer, *Physique and Character.*

Hallucinations are usually present and may involve any sense department. The patient hears voices, sees visions, or feels strange cutaneous sensations, which he describes as "pricks," "prods," or "electric shocks." *Delusions* are also common and are closely related to the hallucinations. They are ordinarily fantastic and illogical, but on occasion they may be partly systematized. Delusions of reference and of mystical influence are particularly frequent. The patient thinks that he is being observed, or that some one is interfering with his mental processes. These ideas are often followed by more marked delusions of persecution and of grandeur. There is likewise a marked variation in the suggestibility of the patient. He is either extremely *hypersuggestible* or extremely *negative* to personal influence; and suggestible and negative phases may alternate in the same patient.

The behavior of the patient is spasmodic, uncertain, and impulsive; it cannot be predicted. There are numerous *mannerisms* and *stereotyped responses,* such as continuous repetition of the same words or phrases. In his suggestible phase the patient may imitate the words and actions of other persons. If he is asked a question he merely repeats the question. This is called *echolalia.* In his negative phase he either does not respond at all, or does the exact opposite of what is suggested. He may remain absolutely *mute* for days at a time. There is also evidence in his behavior of interference of impulses, and consequent *blocking of attention* and of other responses.

Kraepelin distinguished several forms of dementia præcox. Four of them are commonly used in psychiatric classifications. They are differentiated merely by the prominence of certain symptoms, and the distinctions are thus more or less arbitrary. *Simple dementia* is char-

acterized by emotional deterioration and apathy, which is shown in lack of interest or "loss of pride and ambition." The patient is lazy and neglectful, but he has no hallucinations and few delusions. Very few of these cases get into the institutions. They go to swell the ranks of the tramps, prostitutes, and criminals. They can be distinguished from the feeble-minded only by their history; and are therefore frequently found in institutions for the feeble-minded rather than in mental hospitals. *Hebephrenic dementia præcox* is characterized by hallucinations, fantastic ideas, mannerisms, and especially by an incompatibility of ideas and feelings. The patients show a tendency to silliness, smiling, laughing, grimacing, and other childlike behavior.

Catatonic dementia præcox is characterized by prominence of symptoms of negativism and suggestibility. This form has two phases, namely, "catatonic stupor" and "catatonic excitement." The first phase is marked by two groups of symptoms that may alternate. One group is negativism, muscular tension, mutism, and active opposition. The other is hypersuggestibility, cerea flexibilitas, echopraxia, and various automatisms. In catatonic excitement there are increased psychomotor activity, impulsive acts, mannerisms, stereotypy and extreme incoherence.

Paranoid dementia præcox is characterized by a special development of delusions. These may be incoherent, changeable, and fantastic; or they may be more coherent and connectedly elaborated. They are usually of a persecutory or grandiose nature, and are generally accompanied by hallucinations which fit in with the delusions.

The problem of the etiology and nature of dementia præcox has not yet been solved. Some investigators have

reported cortical changes such as cell loss, gliosis, and satellitosis. Others believe that the disease is due to *auto-intoxication* resulting from disorder of glands of internal secretion or from other metabolic disturbances. Life experiences play an important rôle in the development of this psychosis. Adolf Meyer has emphasized the view that it may be regarded as resulting from the acquisition and development of unhealthy and *inadequate habits* of thought and action.[28] Jung has pointed out that the symptoms may be understood as manifestations of *repressed complexes*.[29] But the ultimate nature of the disease still remains a mystery.

Paranoia.—Paranoia was once considered a relatively common mental disease, but now the diagnosis of paranoia is rarely made. Cases previously regarded as paranoiac are now assigned to the paranoid dementia præcox group. The term "paranoia" may, however, be applied to a chronic progressive psychosis which occurs mostly in adult life, and is characterized by the gradual development of a stable system of delusions without noticeable mental deterioration and without marked disorder of memory, feeling, or behavior. No changes have been found in the nervous system in this disease, and it may therefore be regarded as a functional psychosis. The disease develops insidiously on the basis of a peculiar personality which may be described as suspicious and conceited. This *suspicion* and *conceit* gradually develop into actual *delusions* of persecution and of grandeur. The entire mental content of the patient, his ideas, feelings and impulses,

[28] See Adolph Meyer, "The Evolution of the Dementia Precox Concept," in *Schizophrenia*, edited by a committee of the Association for Research in Nervous and Mental Disease (Hoeber, 1928), Chap. i.

[29] C. G. Jung, *The Psychology of Dementia Præcox*, Nervous and Mental Disease Monographs, No. 3 (1909).

become organized about these delusions. There is thus a slow and insidious but definite *transformation of the personality.*

The delusions may assume a great variety of forms and it is thus possible to speak of different kinds of paranoia. In *interpretative paranoia,* the patient misinterprets the facts, and finds hidden and portentous meanings in the most trivial occurrences. In *litigious paranoia,* the patient is continually seeking legal redress for supposed wrongs. He spends most of his time in courts of law, and always has a lawsuit on his hands. Other forms of paranoia are *inventive, religious, amorous, hypochondriacal,* and *reformatory paranoia.* Many paranoiacs are not in institutions. They are often quite harmless people, although they may be nuisances. Cranks, fanatics, and eccentric persons are usually paranoiac characters. But in some cases the paranoiac may be a real danger. He may turn upon his supposed persecutors, and become an actual menace to the individual or the community. Hence many patients in hospitals for the criminally insane are paranoiacs.

There is some evidence that paranoid delusions are *overcompensations for inferiority.* A person who is unsuccessful and consequently fails to achieve promotion is liable to imagine that his employers are persecuting him. Such delusions are still more likely to occur if he actually loses his job. The delusion of grandeur probably develops later as an attempt to explain his persecution. He feels that he must be an important person since people find it worth while attacking him. On the other hand, a delusion of persecution may follow a delusion of grandeur. A person may feel that people must be against him, since they do not recognize his obvious merits. At any rate, it is clear

that the two forms of delusion belong intimately together. Paranoia may be illustrated by the case of the person, described in Chapter XVII, who developed a peculiar psychological theory of the emotions.

Paranoiacs often get into print; and when they do, they write very strange books. They frequently write on obsolete sciences, such as alchemy, astrology, and the Ptolemaic system of astronomy. They may also write on so-called "occult" and "esoteric" subjects, such as necromancy, rosicrucianism, and the prophetic interpretation of dreams. Sometimes they create special scientific or philosophic systems of their own. For instance, one paranoid woman deduced a system of physiology, character analysis, and philosophy from the markings on the finger nails. Other examples were given in Chapter XVII. Books and writings of this sort constitute the mental pabulum of the "intellectual underworld." They are usually more or less incoherent and meaningless, but occasionally they present a superficial appearance of logic. The following paragraphs are copied verbatim from a letter consisting of six full pages of handwritten material all in the same vein. The emotional tone indicates the affective origin of the beliefs expressed and is characteristic of paranoia. The grammatical errors and rambling style are also characteristic.

It was never God's plan that woman should be public leaders, speakers, teachers, or preachers among men, but in her desire to be on equality with men in the public affairs in this life she has entirely slipped out of her realm, now she will be allowed to go her limit but of course with fearful punishment, and because she has not kept her God given place the world is in a fearful condition today. She was to be the keeper of the home, bear and rear the child, and, here, she could reign as queen.

Men have lost all respect for the name woman it seems. Its her own fault. And this is the day of disobedience to parents. Oh then this the result of parental neglect to bring up their children in the Lord. We did not make them mind when they were under our control now its too late, and we see all kinds of crime, disgrace, accidental death and suffering and murder. Oh oh! Mother let her boy go out and do as he pleased evening when a small boy, now, at 18 she say dont go to that dance to night Joe, but he has always had his way, so to the dance, debauch, a ruined murdered girl is the evenings result and Joe last seat is the electric chair without soul salvation, lost, lost! What consternation when mother wakes up in a last eternity with son or daughter wailing in agony forever by her side.

Ponder if you can the wrecked homes, divorces, murders, bobbed hair alone has caused, the good husband did not want the wife to cut her hair and it is his god given right to do so yet she had her way and many times she has paid the fearful penalty herself for it was she who was murdered perhaps by the other man she sought in her anger about husband not wanting her to cut her hair. It is a shame for a woman to have her hair cut, and an abomination unto the Lord for a woman to wear *any* thing that pertaineth to the man. So here is your hair cut and pants. But woman will in wilful defiance of God and man do any thing at any cost. And look at the awful sorrow in the home today because of the wife excessive demands of her husband for more luxuries than his fair wages will buy. If she has clothes enough to cover her nakedness, keep her clean and warm she is to be satisfied, then it would not be such hard times would it, No, no! but in her demands for more, she drives him to crime, suicide or leave home.

CHAPTER XXIX

APPLIED PSYCHOLOGY

Psychology is analogous to physiology and the other biological sciences. It occupies no unique position as an applied science, and if this fact is kept in mind the problems here discussed will present no difficulties. It is, like physiology, primarily a pure science, but can nevertheless be applied in various fields of human activity. Psychology is, however, a relatively new science, and is therefore less ready for application than the other biological sciences. Notwithstanding this fact, there is considerable public demand for applied psychology. This demand cannot always be met, since the public unwittingly ask for application of facts and principles that are not yet known. When psychology fails to provide the expected information, the key to happiness, and the panacea for human ills, some form of pseudoscience steps in with ready-made solutions which please the people and temporarily satisfy their demands. This situation is unfortunate, but psychologists are unable to prevent it or to protect gullible people from the charlatans who prey upon them in the guise of psychologists.

There is, however, a moderate body of psychological fact and doctrine ready for application, and much more could be achieved by systematic research in the various applied fields. In principle, psychology may be applied in all situations where human nature is involved. The most extensive applications have been made in education,

medicine, law, and industry; but application might also be made in other fields, as in preaching, in housekeeping, and even in the work of the scientist. For instance, greater accuracy might be achieved in scientific observation as a result of application of psychology. Wherever psychology is applied the fundamental object of the application is the same. This object is always to *predict* or to *control* human behavior and mental processes. Some of the main branches of applied psychology are described in this chapter, and an attempt is made to *define and delimit the field of psychology.*

Means and ends.—It is necessary in the application of any science to distinguish between means and ends.[1] The end is the practical aim or purpose to be achieved, while the means are the methods of attaining it. Science is always applied to improve means, and not to determine ends. The ends are determined by ethical, social, economic, or political considerations. For example, the desirability of constructing a tunnel is determined by economic and political considerations, and the engineer is employed to determine whether the location is feasible and how the undertaking may best be accomplished. Psychology is like other sciences in this respect. It cannot help to furnish purposes in the various fields of human endeavor, but it can assist in providing the means for achieving them. Some people who have no clear purposes in life may expect psychology to provide aims for them; but these people really need an ethical or social adviser rather than a psychologist.

In certain fields of human endeavor the end or purpose is a generally accepted one. For example, the purpose of

[1] See Hugo Münsterberg, *Psychology and Industrial Efficiency* (Houghton Mifflin, 1913), Chap. iii.

medicine is regarded as the promotion of health and the preservation of life. Psychology may contribute something to the means of attaining this goal, but psychology and the other medical sciences may be used just as well to destroy life. In either case, the scientist does not set the purpose, he merely provides the means. Similarly, psychology may provide some of the means for achieving the aims of education, which are set by educational and social philosophy.

In certain fields where the end is not clear, the entire situation is likely to become decidedly muddled. For example, in child training at the present time there seems to be no general agreement regarding the purposes to be achieved. Hence, parents, guardians, and social philosophers, who should decide such questions, often "pass the buck" to the psychologist who is expected to give advice on these aims rather than on methods of attaining them. He is asked what the child ought to be and ought to do, rather than what he is and how he may be changed. The former are not psychological problems at all but social and educational ones. It is therefore necessary to emphasize that a psychologist, as such, is not a social or vocational adviser any more than he is a physician or an educationist.

Who applies psychology.—Another common but mistaken notion is that a psychologist must be able to apply his science in any field. This is not true of the psychologist nor of any other scientist. A physiologist is not necessarily able to apply physiology in industry or even in medicine. In order to apply any science in any field it is necessary to be conversant with the field in question, and trained in the technique of application. A person must therefore be something more than a psychologist to apply psychology.

It is obvious that in order to apply psychology in medicine, it is necessary to have a thorough knowledge of medical practice and problems, and this requires medical training. Similarly, a person who applies psychology in education must have a knowledge of the theory and practice of education and the problems of school administration. But only a few psychologists are also educationists. In the same way, psychology can be applied in law or in industry only by one who is conversant with legal or with industrial problems. Just because a person is a psychologist, it does not follow that he has the necessary knowledge and training to apply psychology in any of these fields. On the other hand, psychology may be applied by one who has much less knowledge of this science than is required by a psychologist. Physicians, educationists, lawyers, and business executives should be sufficiently trained in psychology to apply it to their respective problems, just as they are trained to apply other sciences.

A psychologist, as such, has only two functions, namely, *teaching* and *research*. In this respect his position is similar to that of a physiologist. The research may, of course, be done on practical problems. It may be carried on in medical, legal, industrial, or educational situations, as well as in psychological laboratories. However, even in this case the psychologist would at first have to learn something about the problems of the particular situation, and would need to carry on his research in coöperation with a member of the profession or occupation concerned.

The psychologist may also, like the chemist or anatomist, act in a consulting capacity to those who desire to apply psychology. But perhaps his greatest contribution

to applied psychology is in the instruction of students preparing for work in the other fields.

Persons who are trained in the technique of intelligence tests and other mental measurements are called *psychometrists*. These psychometrists are frequently employed in hospitals or school systems. Their functions are similar to those of other technicians. For example, in a hospital the results of psychological tests are reported to the psychiatrist, just as the results of a blood test or urine analysis are thus reported. The psychiatrist pools the results of all the findings in making his diagnosis. Similarly, in a school system the reports of the psychometrist are sent to the educationist or to the school psychiatrist for application to their respective problems. The psychometric work might equally well be done by the psychiatrist himself, or by the school superintendent, principal, or teacher, if these persons have had instruction in psychology in their professional training.

Educational psychology.—This is the application of psychology to the problems of the classroom, of teaching, and of school administration. Educational psychology is sometimes regarded as consisting of the psychology of habit formation, transfer of training, and the learning process. These are really topics of general psychology. They belong to educational no more than they belong to industrial or medical psychology. Almost any part of the science may be applied in connection with educational problems. These problems are not only problems of learning and training, but also of grading, promotion, classroom discipline, and so forth.

The actual application of psychology in education is a function of the teachers, principals, and superintendents. Psychological facts and principles might be incor-

porated into the school system and its administration as well as into the methods of teaching. If psychology is to be applied in education, teachers and educationists should study psychology and psychometric techniques as part of their training for the profession. A school system may employ a psychometrist to do the psychometric work and report results to the officials concerned. A psychologist may, of course, carry on research or direct the research of others in a school situation, and he may also act as a consultant to the school board or the teachers.

Industrial psychology.—This is the application of psychology to the problems of commerce and industry. Psychology may be applied in the selection of employees, in increasing the efficiency of workers, in advertising and selling, and so on. The actual application is a function of employment managers, business executives, foremen, practical advertisers, and salesmen. A business organization may also employ a psychometrist for the testing and rating of employees, and the results may be used by the employment manager in conjunction with other data in selecting the workers. A business or industry may also employ a psychologist either in a consulting capacity or to carry on research in the industrial situation. The practical results of such research are evaluated by the executives in relation to other factors, and may be applied by them in conjunction with the results of other sciences.

Legal psychology.—This is the application of psychology to problems in connection with the administration of justice. Psychology may be applied to problems of crime and delinquency, to the problem of the veracity of the witness, and to problems pertaining to the jury, the lawyer, or even the judge. Here the actual application is made by the legal profession and by the "court psy-

chiatrist." Here also a psychometrist may be employed for testing delinquent children or criminals, but in such case the results should be evaluated by the psychiatrist who takes into consideration other factors as well as the results of tests and mental examinations. A psychologist may act in a consulting capacity to a court of law, or may make scientific studies of various problems in practical situations, as in courts, prisons, or institutions for delinquent children. If psychology is to be applied in the courts of law, it should be included as a subject in the professional training of lawyers and judges.

MEDICAL PSYCHOLOGY

The main object of courses in psychology and abnormal psychology for the student of *general medicine* is to give him a psychological point of view, an understanding of some of the fundamental problems, and some knowledge of well-established psychological facts and principles. If this object is attained, he will approach his patient as a psychobiological unit, and as a total personality. He will not only treat patients rather than symptoms, but he will also have a better understanding of the significance of the symptoms in relation to the personality as a whole, and of the rôle of psychogenetic factors in their etiology. The student who proposes to specialize in *psychiatry* should, of course, have more intensive training in psychology and abnormal psychology. This training should include courses in experimental psychology, the technique of mental testing, and other forms of mental examination.

The general application of psychology to medical problems has been suggested or implied throughout this book. The actual application in detail should form part of the clinical training of medical students, and should be

taught by the clinical instructors. However, at the present time psychology is not applied in clinical training as physiology and pathology are. It is thus desirable to sum up here a few general points of major importance. This, however, cannot take the place of instruction in the specific application of psychology to actual clinical cases. The student will not reap the full benefit of a course in psychology until his *clinical instructors* are as conversant with psychology as with physiology, pathology, and other sciences basic to the practice of medicine.

There are three major problems in medicine: *prevention, diagnosis,* and *treatment.* Psychology may be applied in connection with each of these problems. There are thus three branches of medical psychology: psychoprophylactics, psychodiagnostics and psychotherapeutics. The actual application of psychology to any medical problem should, of course, be made by the physician and the psychiatrist, and may be made in cases of ordinary physical illness as well as in cases of mental disease. The physician or psychiatrist may employ a psychometrist for the application of technical methods, just as he may employ a biochemist for a similar purpose. A psychologist without medical training has no more right to practice in the medical sense than has the chemist or physiologist who is not trained in medicine. The function of the psychologist is to instruct medical students in the fundamentals of psychology, to do research work on the psychological problems of medicine, and to act in a consulting capacity to physicians or psychiatrists.

Psychoprophylaxis.—This means the preservation of health by psychological methods. It is one of the aims of the "mental hygiene movement," and a part of preventive medicine. Psychology may be applied in the prevention of

physical disease. The physician must persuade a patient to regulate his life in such a way as to prevent tuberculosis or arteriosclerosis. He must also overcome public apathy regarding matters of health and sanitation, and influence people to take the necessary precautions to prevent the spread of infectious diseases. He must likewise persuade legislators to enact laws essential for public health. Psychology is involved in all these undertakings. Furthermore, psychology may be applied more directly in the prevention of physical illness. For example, digestive disturbances may be prevented by avoiding emotional upsets at meal time; and other physical ailments may be prevented by taking sufficient rest and avoiding excesses.

Psychology may also be applied in the prevention of *mental disorders,* particularly the psychoneuroses, and in the prevention of minor *maladjustments* which cause inefficiency and unhappiness in everyday life. The causes of these diseases and maladjustments are frequently traceable to experience of childhood and infancy. They may be prevented by providing an optimum environment and optimum training for the child. He would thus become "conditioned" in a healthy way, and develop desirable habits of thought, feeling, and conduct. Childhood *delinquency,* likewise, is often the outcome of an unhealthy and repressing situation. Such delinquency may evolve into adult crime. The problem set is thus a definite one, but the solution has yet to be found. Psychoprophylaxis is still chiefly a program for research. We do not know what the optimum conditions for healthy mental development are. This would be a fruitful field for study by pediatricians and psychiatrists as well as by psychologists.

Psychodiagnosis.—This is the application of psychology in making a diagnosis. In general, psychology

leads to a better understanding of human nature as a whole, and consequently to a better appreciation of the mental factors in the particular case, such as the attitude towards the illness and the motives that may underlie it. More particularly, psychology may assist in the diagnosis of *physical diseases,* for ordinary physical diseases frequently have their characteristic mental symptoms. It is, however, of more obvious importance in the diagnosis of *mental diseases.* Some of these may be diagnosed on the mental symptoms alone, but as a rule physical symptoms must also be taken into account. The same is true with reference to the diagnosis of *mental defect.*

In psychodiagnosis the psychological *techniques of testing and examining* are of considerable value. This is particularly true in the diagnosis of mental defect. In hospital clinics a psychometrist is frequently employed for making such tests and examinations. The results of these psychological tests are reported to the psychiatrist along with the other findings, physical, biochemical, and social. The psychiatrist arrives at his diagnosis after a consideration of all these findings. A psychiatrist should obviously be trained in these psychological methods as well as in the techniques of other medical sciences. Psychodiagnosis is, like psychoprophylaxis, at the present time, chiefly a possibility and a program for research. Almost the whole of normal and abnormal psychology is involved, and contributions may be made by psychologists working in almost any field of psychology. Research in the abnormal field is, however, of special importance in this connection.

Psychotherapy.—This is probably the oldest branch of applied psychology. It began in the mysticism and miracles of the ancient medicine men, who have their

modern representatives in the members of various healing cults and the charlatans of to-day. All physicians use psychotherapy whether they wish to or not. They use suggestion in their attitude and bearing as well as in their spoken words and in their prescriptions. The effect of any prescribed treatment is in part due to suggestion. Physicians might use psychotherapy more effectively if they knew more about it. They could thus offset the influence of various cults that thrive on the gullibility of the public.

Psychotherapy is the application of psychology in treatment. It may be used in physical illness as well as in mental diseases. It should of course be used only by a physician or under a physician's direction, and like other therapeutic methods it should be used only when indicated by the general conditions and specific symptoms. Moreover, different psychotherapeutic methods may be indicated in different cases and under different conditions. Some of the more common methods are briefly described by way of introduction to the extensive literature on this subject.

A well-known method that may be classed here is the *rest cure* recommended by Weir Mitchell.[2] He laid emphasis on seclusion, rest, massage, electricity, and feeding. This treatment met with a large measure of success. Perhaps part of its success was due to the change of activity involved. A common view to-day is that a *work cure* may be equally effective in certain cases. The *play cure* was mentioned in Chapter XIX. It may likewise be an effective treatment in cases of loss of interest in work through pressure of unsatisfied drives or impulses.

[2] S. W. Mitchell, *On Rest in the Treatment of Nervous Diseases* (Putnam, 1875).

A combination of the rest and play cures is no doubt of distinct therapeutic value in many cases, particularly of neurasthenia.

Another psychotherapeutic method is *persuasion and reasoning*. This method was set forth especially by Dubois [3] and Déjerine.[4] It has been termed a system of rational therapeutics. The state of affairs as the physician sees it is explained to the patient, the psychological nature of the disorder is emphasized, and no physical treatment is given. The treatment consists in encouragement, exhortation, persuasion, and reasoning. This treatment sometimes produces good results. But the difficulty is that rational conviction does not always remove the distressing symptoms. The patient may accept the view that his symptoms are irrational or have a purely psychological origin, and yet the symptoms may persist. An "appeal to feeling and impulse" would be more effective in producing a cure. Such an appeal in the form of suggestion is involved to some extent in Dubois' method, and may account in part for his success. Furthermore, "appeal to reason" is more likely to be successful if the underlying causes of the disorder are first revealed to the patient through a process of mental analysis.

There are several psychotherapeutic methods based upon *suggestion*. Suggestion was used unconsciously by primitive medicine men, and it is still employed more or less unconsciously by the "faith healers" of to-day. Suggestion is also the main therapeutic factor in pilgrimages to shrines noted for their cures. Many cures are actually

[3] Paul Dubois, *The Psychic Treatment of Nervous Disorders*, translated by W. A. White and S. E. Jelliffe (Funk and Wagnalls, 1905).

[4] J. J. Déjerine and Ernest Gauckler, *The Psychoneuroses and Their Treatment by Psychotherapy*, translated by S. E. Jelliffe (Lippincott, 1913).

effected by such methods, and this may be regarded as tangible evidence of the power of suggestion. The psychology of suggestion was discussed in Chapter XX. Here it is considered briefly as a method of treatment.

Suggestion may be used therapeutically in a number of different ways. In the first place, suggestions may be given in *hypnosis*. The nature of hypnosis and the technique of producing the hypnotic state were also previously described. Suggestion in the hypnotic state was used with considerable success by Bernheim and Charcot in the nineteenth century.[5] It is still used to some extent by Prince, [6] Janet,[7] and others. It has, however, a limited value since many persons cannot readily be hypnotized. Sidis found that only a small proportion of his patients could be hypnotized, and he therefore gave them therapeutic suggestions in what he called the *hypnoidal state*.[8] This is a condition of abstraction, drowsiness, or partial hypnosis, somewhat analogous to the resting state of animals. Sidis found that nearly all his patients could be put into this drowsy condition, and that the suggestions given in this condition were fully as effective as those given in the hypnotic state.

Suggestions may also be given in the ordinary *waking state*.[9] In this case the suggestions are the more effective, the more indirect they are. They also vary in effectiveness with the prestige of the physician and the suggestibility of

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[5] See Hippolyte Bernheim, *Suggestive Therapeutics* (Putnam, 1889).

[6] Morton Prince, *The Dissociation of a Personality* (Longmans, Green, 1906).

[7] Pierre Janet, *Principles of Psychotherapy* (Macmillan, 1924).

[8] Boris Sidis, *The Causation and Treatment of Psychopathic Diseases* (Badger, 1916).

[9] Hugo Münsterberg, *Psychotherapy* (Moffatt, Yard, 1909), pp. 215-225.

the patient. A sick person is usually in a hypersuggestible and submissive frame of mind, and is therefore more open to suggestion. The physician should remember that his presence, attitude, and words have a suggestive effect which might be enhanced and used more effectively if consciously directed.

Suggestions may likewise be given by a person to himself. This is called *autosuggestion.* We are all familiar with the slogan made popular by Coué: "Every day in every way I am getting better and better." Coué recommended that this suggestion should be given by the patient to himself in the drowsy state just before falling asleep, and that in repeating the sentence he should use his imagination rather than his will. This means that the patient should not make any conscious effort, which is likely to defeat its own purpose, but should rather picture himself in the condition which he desires.[10] The method may have a therapeutic value in some cases, but as a rule it is not as effective as heterosuggestion. It is extremely difficult for some persons to accept autosuggestions, and many people tend to imagine the very opposite of what they are saying.

Suggestion is a particularly valuable therapeutic method in the psychoneuroses. It helps in synthesizing dissociated processes, and it may thus reënergize the organism and remove the symptoms. In this respect it is usually more effective than reasoning or persuasion. Persuasion, of course, generally involves suggestion. It has, however, been objected that suggestion does not really remove the underlying causes of the disease. It merely removes symptoms, while the fundamental causes may persist and

[10] See Charles Baudouin, *Suggestion and Autosuggestion* (Allen & Unwin, 1921).

manifest themselves in some new form. There is a certain element of truth in this objection; but on the other hand, it may be argued that suggestion does sometimes affect the causes of the disorder by changing or modifying the pathogenic motives, and that in any case the removal of symptoms is a desirable end in itself. Suggestion therefore remains a very important psychotherapeutic method.

Another group of psychotherapeutic procedures are the analytic methods or *methods of mental analysis*. These methods include all forms of therapy which aim to treat the patient by making a psychological analysis of his personality, thereby revealing the underlying causes of the trouble. The *psychoanalysis* of Sigmund Freud belongs here.[11] Freud found that if a patient took his symptoms or his dreams as a starting point he could through a process of free association bring into consciousness more and more forgotten experiences from early childhood. He also found that this course led to the revelation of childhood sexual experiences or wishes, and resulted finally in the removal of the symptoms. Freud's theory of the unconscious was outlined in Chapter V.

Jung [12] and Adler [13] have departed from Freud in their underlying theories, but their analytic methods remain very similar to his. The method is a valuable one, but it is, of course, not necessary that it should always result in the revelation of sexual material. Psychoanalysis has been called a "talking cure" in which the patient does most of the talking. It is not really incompatible with neurological principles. The process of speaking and hearing

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[11] Sigmund Freud, *A General Introduction to Psychoanalysis.*

[12] C. G. Jung, *The Theory of Psychoanalysis,* Nervous and Mental Disease Monographs, No. 19 (1915).

[13] Alfred Adler, *Individual Psychology* (Harcourt, Brace, 1924).

results in a reactivation of dissociated neurograms. Psychoanalysis is neurologically the attempt to direct neural energy into dissociated neural patterns. When the attempt is successful, the forgotten or repressed experiences are brought again to mind.

Janet's therapeutic procedure belongs in part to the method of mental analysis.[14] He makes use of suggestion as well, but he lays particular emphasis upon the study of the *life history* of the individual. This life history is reported by the patient, and may be corroborated by the evidence of other persons. Prince also uses a form of mental analysis as well as suggestive therapeutics.[15] He tries to bring into consciousness the unconscious or coconscious systems of ideas, impulses, and feelings. He frequently makes use of hypnosis to facilitate this process. The cure of the patient is essentially a synthesis of his personality. The *psychognosis* of Sidis is likewise a form of mental analysis.[16] His technique is similar to that of Prince and Janet; he, also, stresses study of the psychological make-up and life history of the patients.

It is reasonable to suppose that the mental analysis of a patient is the logical first step in treatment. This mental analysis should include study of his life history, his instincts, emotions, sentiments, purposes, and so forth. Some of these factors may be well known to the patient, others may be outside his consciousness. The latter may frequently be brought into consciousness through an analytic procedure involving free association, dream analysis, and the like. The patient's consciousness is thus extended and

[14] Pierre Janet, *Psychological Healing* (Allen & Unwin, 1925).

[15] Morton Prince, "The Psychological Principles and Field of Psychotherapy," in *Psychotherapeutics* (Badger, 1909).

[16] Boris Sidis, *Symptomatology, Psychognosis and Diagnosis of Psychopathic Diseases* (Badger, 1914).

he becomes more aware of himself and the motives underlying his illness. This greater knowledge of the self means greater unity and more complete synthesis of the personality. The value of a method of psychological analysis and explanation is indicated by the following case, described by E. W. Taylor:

A young woman of small worldly experience decides to take up nursing. She is accepted as a probationer at a hospital and is forthwith given the job of cleaning up the operating room after an operation. This she does with sufficient enthusiasm, but with a sense of repulsion and disgust at the sight of blood-stained dressings and other post-operative conditions. Her imagination is naturally busily at work and although she completes her task it is not without grave misgivings as to the future and her ability to meet the ordeal of which this is the somewhat gruesome beginning. Her determination, however, remains unshaken as far as her conscious attitude is concerned, but subconsciously, call it what you will, she revolts against a repetition of the experience she has just had. The result is a conflict between her conscious determination to become a nurse at whatever cost, and her unconscious revolt against the means to that end. The outcome of this conflict, of which naturally she is unaware, is a complete motor and sensory paralysis of the right arm. The emotional conflict has resulted in a compromise, namely the paralysis, which while it saves her the ignominy of confessing failure at the outset of her career, at the same time prevents her from repeating her unpleasant experience, since the arm with which she mopped the floor is now quite useless. In other words, through no will of her own, she has escaped from an intolerable situation and saved her face, as it were, in the operation. A knowledge of the mechanism of such hysterical disturbances makes the cure possible. After four or five weeks of paralysis she consults a physician, who explains to her that the paralysis of the arm is in no way serious or permanent but is merely the expression of her inability to accomplish the work she has set herself to do; that her intentions are the best, but that her inherent capacity to carry them through is

lacking. The spirit is strong enough, but the flesh is lamentably weak. It is furthermore explained that the paralysis of the arm is merely a very effective method of escaping what she really wishes to avoid, namely the repellent duty of again washing the floor under similar conditions. With such an explanation, the paralysis quickly disappears, through making conscious and bringing into the field of reason what was before unconscious or subconscious and therefore not amenable to self-cure.[17]

In some cases the illness may persist even when the patient becomes conscious of its psychogenetic origin. A person may become aware of a motive, a feeling, or a prejudice without being able at once to change it. In such cases the condition has become habitual and some form of reëducation is required. This brings us to the last group of psychotherapeutic methods which may be designated as *readjustment or reëducation methods*. When mental analysis is not followed by cure, training in new habits of thought, feeling, or action is the next step in the therapeutic process. This may involve providing the patient with a "new philosophy of life" as well as training him in the specific habits desired. Reëducation is in part a process or reconditioning. The patient must make a readjustment to the actual situations and conditions of his life. He must also learn to face his problem, solve his conflict, or harmonize his impulses.

A form of reëducation that is very generally used in sanatoriums and hospitals for the mentally diseased is *occupational therapy*. An interesting occupation keeps the patient in contact with reality and prevents mental deterioration. It may also provide a positive motive for recovery. This method proved quite effective in the re-

[17] E. W. Taylor, "Psychotherapy," *Harvard Health Talks* (Harvard University Press, 1926). Quoted by permission.

habilitation of disabled soldiers. Still another form of reëducation is the *habit training* that has been tried out successfully with patients suffering from imperception, aphasia, and even paralysis.[18] It is now recognized that aphasic patients may actually recover the ability to speak if they have the patience to go through the tedious process of relearning the lost language habits.

Each of the psychotherapeutic methods described has its own value and sphere of usefulness. Different methods are required with different patients having different disorders and different types of personality. There is no one best method, but perhaps the best combination of methods is mental analysis followed by suggestion or reëducation. Psychotherapy like other branches of medical psychology is still in process of development and requires further study and scientific investigation. The present situation may be summed up in the words of E. W. Taylor:

> The future of psychotherapy, halting as its progress has been, is now assured. Sufficient facts and observations are at hand to permit of generalizations of scientific value. Much, however, remains to be accomplished before this branch of therapeutics can take its place on an equal footing with the recognized methods of physical therapy. A great responsibility rests upon our medical schools in this regard. If psychotherapy is to advance along rational lines, it must remain essentially in the hands of the medical profession, from whom it already shows signs of passing. To this end, subjects dealing with the mind should be given equal importance with those dealing with the body in the premedical as well as in the medical course. The tendency, which has been so marked a feature of medical practice up to this time, to ignore the personality of the patient in the attempt to treat his disease must give place to the broader conception that the physician's duty is to study the reactions of the

[18] S. I. Franz, *Nervous and Mental Reëducation* (Macmillan, 1923).

patient to his disorder with the same painstaking care that he studies the physical conditions of the disease. It has been said with considerable justice that medicine has hitherto been concerned with organs, rather than with persons. The time has certainly come, and our knowledge, imperfect as it is, is sufficient to accept the broader implications of treatment which a rational psychotherapy permits. Again I emphasize the word "rational," since we have finally attained knowledge in this difficult but most important field of research, which every well-trained physician must in some degree master, if, as he should, he sets himself the task of treating disease by all legitimate methods.[19]

[19] E. W. Taylor, *ibid.* Quoted by permission.

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